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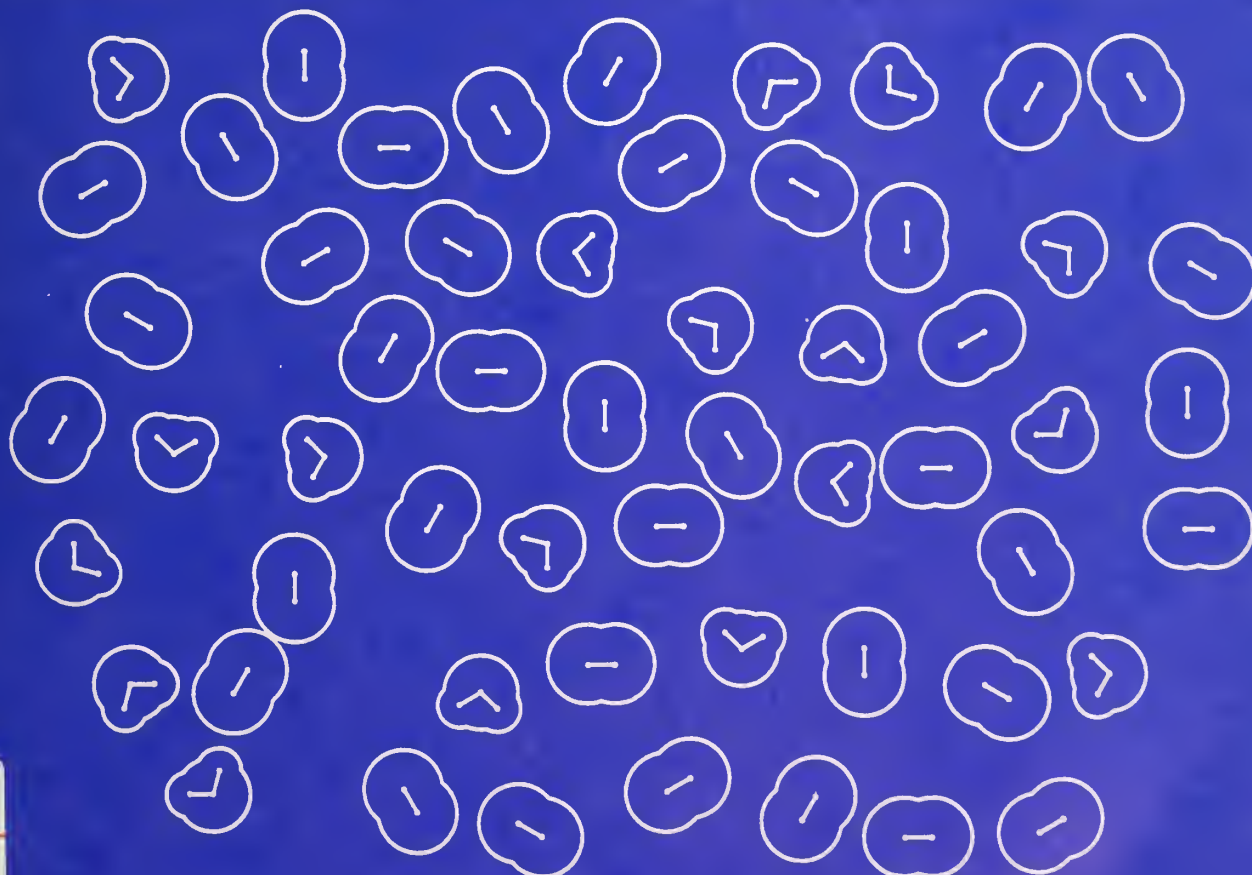
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Thermodynamic Properties of Homogeneous Mixtures of Nitrogen and Water from 440 to 1000 K, up to 100 MPa and 0.8 mole fraction N_2

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Thermodynamic Properties of Homogeneous Mixtures of Nitrogen and Water from 440 to 1000 K, up to 100 MPa and 0.8 mole fraction N₂

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**Thermodynamic Properties of Homogeneous Mixtures of Nitrogen and Water
from 440 to 1000 K, up to 100 MPa and 0.8 mole fraction N₂**

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A generalized corresponding-states model of the Helmholtz free energy for fluid mixtures, with pure water as the reference fluid, has been used to model the solubility and thermodynamic properties of nitrogen in water in homogeneous states in a wide range of temperatures and pressures around the water critical point. The model predictions are compared with the literature data available in this range. Tabulated values of density, enthalpy, isobaric heat capacity and fugacity coefficients are presented at selected entries of pressure from 0.05 to 100 MPa, of temperature from 440 to 1000 K, and of nitrogen mole fractions up to 0.8. Also presented are tables of infinite-dilution (standard-state) properties of the nitrogen solute in the same pressure and temperature range.

Key words: corresponding states; density; enthalpy; fugacity; heat capacity; Henry's constant; mixture; nitrogen; solubility; standard states; steam; water.

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List of symbols

| | |
|--------------------|--|
| A | molar Helmholtz free energy |
| a_{-1}, a_0, a_1 | constants defining C_p^{perf} of nitrogen |
| C | molar heat capacity |
| C_{p2} | solute isobaric partial molar heat capacity |
| H | molar enthalpy |
| H_2 | solute partial molar enthalpy |
| f | scale factor for temperature |
| f_i | fugacity of component i |
| h | scale factor for volume |
| j | mixing parameter for temperature |
| k | mixing parameter for volume |
| k_B | Boltzmann's constant |
| k_H | Henry's constant |
| p | pressure |
| R | molar gas constant |
| T | absolute temperature |
| V | molar volume |
| V_2 | solute partial molar volume |
| x | mole fraction of nitrogen |
| z | compressibility factor pV/RT |

Greek symbols

| | |
|---|--|
| θ | shape factor for temperature |
| $\theta_0, \theta_V, \theta_T, \theta_{VT}$ | constants in temperature shape factor expression |
| ρ | density |
| φ_i | fugacity coefficient of component i |
| ϕ | shape factor for volume |
| $\phi_0, \phi_V, \phi_T, \phi_{VT}$ | constants in volume shape factor expression |

Subscripts

| | |
|-----|---|
| i | component |
| 1 | solvent |
| 2 | solute |
| s | solute |
| w | water |
| liq | liquid, or the denser coexisting phase |
| vap | vapor, or the less dense coexisting phase |

Superscripts

| | |
|------|--|
| * | pure solvent |
| ** | reference value |
| c | critical (pure fluid) pseudocritical or related reference state (fluid mixture) |
| E | excess |
| mol | molecular |
| perf | perfect-gas |
| res | residual |

1. Introduction

The solubility of air constituents in water has been a topic of considerable practical interest for a long time. As a consequence, there is a rich and accurate data-base in the temperature range from the freezing point to the boiling point of water. For entries into the literature on this topic, we refer to the IUPAC Solubility Series [1], as well as to the reviews by Fernandez-Prini and Crovetto [2], and by Wilhelm et al. [3]. The emerging technology of supercritical water oxidation (SCWO) as well as the mounting interest in water as a reaction medium [4] are giving rise to demand for data on fugacity coefficients, density and enthalpy for systems such as air constituents in water at temperatures and pressures near and above those of the critical point of water, which is located at approximately 647 K and 22 MPa [5].

The phase diagram of the system water-nitrogen is of the type III-m in the classification of van Konynenburg and Scott [6], just like those of other air constituents in water, such as oxygen, argon and carbon dioxide. This implies that a gas-gas equilibrium line emerges from the critical point of steam, moving quickly to high pressures after passing through a minimum in temperature. This minimum is quite shallow, only a few kelvin, for the solutes nitrogen, oxygen and argon, but deep in the case of carbon dioxide as a solute.

For the system carbon dioxide in water, we recently developed a Helmholtz free energy formulation for use in the water-rich phase at near-critical and supercritical conditions [7]. We used a generalized principle of corresponding states with pure water as the reference fluid. The model has been described in detail in a recent publication [7], to which we refer for information and for computer codes. The model permits calculation of the critical line, phase boundaries, and all thermodynamic properties of interest.

In applications of SCWO, the thermodynamic properties of mixtures of air constituents and water are urgently needed. In view of the fact that the availability of data for the oxygen-water system is extremely limited, we have decided to first develop and test a model for the system nitrogen-water, for which five new data sets have become available in the past decade.

We discuss the data sources in Section 2. In Section 3, we give a concise summary of the thermodynamic model, describe how it was fitted to the data, and list the model parameters.

In Section 4, we compare with the available data, and discuss the mutual agreement or disagreement of the various data sources, as well as the adequacy of the model in the various ranges. We make some observations on the extraction of infinite-dilution properties, in particular the Henry constant, from experimental data.

In Section 6, we describe the range in which the model is valid, and estimate the accuracy in that range. We close with some concluding remarks in Section 7. Appendix A contains the tabular material, including the model parameters, and comparisons with available pVTx and solubility data. We also tabulate the predicted molar volume, enthalpy, and the fugacity coefficients of the two components in the range 440-1000 K in temperature, 0.05-100 MPa in pressure, and 0.05-0.8 in mole fraction of nitrogen. In addition, we present a table of infinite-dilution or standard state properties: partial molar volume, partial molar enthalpy, and fugacity coefficient of the nitrogen solute in the same temperature and pressure range as for the first set of tables.

2. Review of the Experimental Data

Early investigations of the phase behavior of nitrogen in near-critical and supercritical water are those of Tsiklis and coworkers [8]. These authors measured liquid-gas and gas-gas equilibrium in pressure-composition space at three temperatures, up to 385 °C and at pressures up to 400 MPa. These data have only been presented in graphical form, but some tabulated values are available for four points on the critical curve.

The principal data source for the high-temperature coexisting phases is the comprehensive study of Japas and Franck [9]. These authors measured liquid-gas and gas-gas phase separation for mixtures of thirteen different concentrations ("isopleths") between 523 and 673 K and from 20 to 270 MPa. A measured amount of a mixture of known composition was heated isochorically in a windowed autoclave of known volume. At the transition from the two-phase to the homogeneous state, the p-T isochore showed a change of slope. This observation provided pressure, temperature, composition and density of one point in the liquid, or high-density gas phase on the three-dimensional two-phase envelope. This determination was corroborated by a direct observation of the appearance of a second phase, or of critical opalescence. Over 60 phase boundary data were reported. In addition, at the temperature of 673 K, 65 pVx data points were obtained in the homogeneous phase, at compositions from 0.134 to 0.9 mole fraction of water. The authors claimed uncertainties on the level of ± 0.5 K in temperature, and ± 0.1 MPa in pressure. The critical curve was constructed as the envelope of the isopleths in p-T space. For nine points on this curve, pressure, molar volume, temperature and composition were listed. The authors confirmed the critical line of Tsiklis and coworkers [8], and also their finding that the gas-gas critical line has a minimum in temperature.

For temperatures below the critical point of water, Henry's constants were estimated by extrapolating gas solubilities measured as a function of pressure to the saturation pressure of pure water. The authors claimed only qualitative estimates [9], given the large uncertainty of the pressure extrapolation.

The pVTx data of Japas and Franck in the homogeneous phase have been recently supplemented by data from two different sources. One of us, Abdulagatov, with his coworkers [10] measured pVTx over the full composition range from 523 to 663 K and at pressures up to 70 MPa. The sample was confined to a 33 cm³ cylindrical cell of a corrosion-resistant steel alloy, provided with a steel ball for stirring; the cell was separated from the rest of the fill and pressure measurement system by a diaphragm-type null indicator. The volume of the cell was determined by weighing with water, with an uncertainty of 0.1%. The volume was corrected for temperature expansion by means of the known expansion coefficient of the alloy. Pressure was measured by means of a dead-weight gage with a precision of 0.002 MPa. Pressures are listed to the nearest 0.01 MPa only, so that the uncertainty of pressures below 10 MPa is more than 0.1 %. The composition was determined by analysis of samples taken from the cell, with an uncertainty of ± 0.002 in mole fraction. The uncertainties of pressure and density values are stated as ± 0.2 %, respectively, in the abstract to the paper. A total of 55 data were taken for the system nitrogen-water, for three different isotherms and more than a dozen different compositions.

Two of us, Watson and Fenghour, measured pVTx of nitrogen-water mixtures in a spherical pressure vessel connected by a line of very small dead volume to a mercury-operated gas-oil separator of novel design. The mercury level was automatically maintained at a fixed level at the sample side. The volume of the pressure vessel was determined with 10 ppm uncertainty, in the manner worked out by Moldover [11] for his spherical acoustic resonators. A total of 101 pVTx data at ten nitrogen mole fractions from 0.36 to 0.94 were measured, with one isochore for each mole fraction, with temperatures from 428 to 697 K, and with pressures up to 30 MPa. These authors claim an uncertainty in the density of less than 0.2%.

Nitrogen solubility data in water, a total of 31 points in the range of 336 to 636 K, were recently reported by Alvarez et al. [12]. These authors measured the composition of the liquid phase as a function of the pressure increment over that of saturated pure water. The temperature stability and precision were on the level of 0.2 K at the higher temperatures. Pressures were measured with an uncertainty no larger than 0.2%. The nitrogen mole fraction in the liquid phase was of the order of 10^{-4} to 10^{-2} and reported to 3 or 4

significant figures. The authors derived values of the Henry constant from their data, using approximations based on molecular theory in order to make the various nonideality corrections in the coexisting phases [12, 13] Wormald and Colling [14] measured the excess enthalpy of mixing of equimolar mixtures of nitrogen and steam in a flow calorimeter of a design suitable for supercritical aqueous mixtures. They took 74 data from 448 to 698 K, and at pressures up to 12.6 MPa. Wormald [13] recently reevaluated and supplemented these data, to a total of 77 points, and estimated their uncertainty to be on the level of $\pm 1.5\%$ in H^E .

Our model allows a check of the mutual consistency of these various data sources. The model is directly fitted to the liquid-phase compositions in the experiments that were used to determine Henry constants, and is then used to calculate the infinite-dilution values of the Henry constant without introducing additional approximations.

3. The Helmholtz Free Energy for the Mixture

3.1 Generalized Corresponding-States Model

The Helmholtz free energy model used here is inspired by the generalized principle of corresponding states, as developed by Rowlinson and Watson [16], Leland and coworkers [17, 18], and Ely and coworkers [19, 20]. Our application, being geared towards mixtures with water as the principal component, uses only one reference fluid, namely water. The NBS/NRC Helmholtz free energy of water and steam [21], in the dimensionless form of Kestin et al. is used as a formulation for the reference fluid [22].

A detailed description of this free energy formulation was given in a recent publication [7]. Here, we present a brief summary of the most important relations.

All thermodynamic properties of the binary mixture of mole fraction x of solute (s, component 2) in water (w, component 1) are derived from the molar Helmholtz free energy $A(V, T, x)$, with V the molar volume and T the absolute temperature. The molar Helmholtz free energy is written as the sum of a perfect-gas part and a residual part, as follows

$$\begin{aligned} A(V, T, x)/RT &= (1-x) A_w^{\text{mol}}(T)/RT + x A_s^{\text{mol}}(T)/RT \\ &\quad - 1 - \ln V/\Lambda^3 + x \ln x + (1-x) \ln(1-x) \\ &\quad + A^{\text{res}}(V, T, x)/RT \end{aligned} \tag{1}$$

The first line represents the contributions from the intramolecular rotational and vibrational degrees of freedom to the perfect-gas part of the Helmholtz free energy, the second line represents the perfect-gas translational and mixing contributions, and the third line the residual, or real-gas contributions [7, 16]. The symbol Λ represents the length $(h^2/2\pi mkT)^{1/2}$, with h Planck's constant.

According to the principle of generalized corresponding states, the residual molar Helmholtz free energy for a mixture with mole fraction x of solute, at temperature T and molar volume V , is mapped onto the residual molar Helmholtz free energy of pure water, A_w , at a displaced temperature T_w and a displaced molar volume V_w , by the relation

$$A^{\text{res}}(V, T, x) = f_x A_w^{\text{res}}(V_w = V/h_x, T_w = T/f_x) \quad (2)$$

with the scale factors for temperature, f_x , and for volume, h_x , being functions of V_w and T_w . The scale factors, in turn, are related to the shape factors θ_x, ϕ_x , by

$$\begin{aligned} f_x(V_w, T_w) &= (T_x^c/T_w^c) \theta_x(V_w, T_w) \\ h_x(V_w, T_w) &= (V_x^c/V_w^c) \phi_x(V_w, T_w) \end{aligned} \quad (3)$$

Here the superscript c on properties subscripted w indicates a value taken at the critical point of pure water. On mixture properties (those with subscript x) it indicates a composition-dependent reference curve, to be defined below. This reference curve reduces to the van der Waals pseudocritical curve in the original two-parameter corresponding states.

The functions $\theta_x(V_w, T_w)$ and $\phi_x(V_w, T_w)$ are shape factors [14, 18], slowly varying functions of T_w and V_w , which represent departures from the two-parameter law of corresponding states. The shape factors $\theta(V_w, T_w)$ and $\phi(V_w, T_w)$ of pure nitrogen, relative to water, are assumed to be of the form

$$\begin{aligned} \theta(V_w, T_w) &= 1 + \theta_V(V_w/V_w^c - 1) + \theta_T(T_w/T_w^c - 1) + \theta_{VT}(V_w/V_w^c - 1)(T_w/T_w^c - 1) \\ \phi(V_w, T_w) &= \phi_0 + \phi_V(V_w/V_w^c - 1) + \phi_T(T_w/T_w^c - 1) + \phi_{VT}(V_w/V_w^c - 1)(T_w/T_w^c - 1) \end{aligned} \quad (4)$$

Here θ_V , θ_T , θ_{VT} and ϕ_0 , ϕ_V , ϕ_T and ϕ_{VT} are adjustable parameters, while ϕ_0 is set equal to $z_{N_2}^c/z_w^c$, the ratio of the critical compressibility factors of nitrogen and water.

The shape factors $\theta_x(V_w, T_w)$ and $\phi_x(V_w, T_w)$ for the mixture of composition x , mapped to T_w , V_w , are calculated from $\theta(V_w, T_w)$ and $\phi(V_w, T_w)$ by means of the following empirical interpolation equation

$$\begin{aligned}\theta_x &= (1-x)^2 + 2x(1-x)\theta^{1/2} + x^2\theta \\ \phi_x &= (1-x) + x\phi\end{aligned}\quad (5)$$

Finally, it is necessary to specify the parameters V_x^c and T_x^c of the mixture of composition x , which reduce to the van der Waals pseudocritical parameters in his generalization of two-parameter corresponding states to mixtures. These are calculated from critical-point values of the pure components by means of the mixture rules

$$\begin{aligned}V_x^c &= (1-x)^2 V_w^c + 2x(1-x) V_{ws}^c + x^2 V_s^c \\ T_x^c &= (1-x)^2 T_w^c + 2x(1-x) T_{ws}^c + x^2 T_s^c\end{aligned}\quad (6)$$

The parameter T_s^c equals the critical temperature of nitrogen, $T_c = 126.20$ K. V_s^c equals $V_{N_2}^c/\phi_0$, with $V_{N_2}^c$, the critical volume of nitrogen, equal to $3.215 \text{ dm}^3 \text{ kg}^{-1}$. The parameters V_{ws}^c , T_{ws}^c are calculated from Lorentz-Berthelot type combining rules

$$\begin{aligned}V_{ws}^c &= k [(V_w^c)^{1/3} + (V_s^c)^{1/3}]^3 / 2^3 \\ T_{ws}^c &= j [T_w^c T_s^c]^{1/2}\end{aligned}\quad (7)$$

where k and j are adjustable interaction parameters. In addition to the pure-component critical parameters, which are not adjusted, the model has eight adjustable parameters, six in the shape factors and two in the combining rules.

3.2 The Model Parameters

The model parameters of the system nitrogen-water were determined in the following steps. For the reference fluid, water, we used the full Helmholtz free energy which is the basis of the NBS/NRC Steam tables [21]. It was used in the dimensionless form of Kestin et al. [22]. The NBS/NRC equation is formulated on the International Practical Temperature Scale of 1968. Short of refitting this equation to the original data base transformed to the ITS-90, a task far exceeding the scope of this work, there is no good way of correcting the formulation while retaining consistency of the derived properties. Thus, strictly speaking, the work presented here is on the IPTS-68 scale, which differs from ITS-90 by at most a few tenths of a kelvin in the present range of application. In practice, the departures of the data from the optimized model are such that considering the present model as formulated on ITS-90 introduces little additional error.

The perfect-gas properties and the critical parameters of nitrogen were obtained from the correlations of Stewart and Jacobsen [23] and of Jacobsen et al. [24]. They use multiparameter expressions valid over large ranges of temperature far exceeding the range of interest here. For our application, the perfect - gas heat capacity C_V^{perf} was obtained by fitting, in our temperature range, the values for this quantity tabulated in Ref. 21 by a quadratic function of temperature

$$\begin{aligned} C_V^{\text{perf}}/S^{**} &\equiv C_V^{\text{mol}} + R = \\ &= a_{-1} T^{**}/T + a_0 + a_1 T/T^{**}, \quad 400 \text{ K} < T < 1000 \text{ K} \end{aligned} \quad (8)$$

The coefficients a_{-1} , a_0 and a_1 are listed in Table 1. Constants subscripted by two asterisks, such as S^{**} and T^{**} , are reference constants used to make the formulation of the Helmholtz free energy of steam dimensionless; they are given in Ref. 22. They show up in eqs (8) and (9) because all ideal-gas properties of water and nitrogen are mole-averaged in dimensionless form and converted to dimensioned units only at the last stage of calculation. Equation (8) represents the tabulated ideal-gas heat capacities to 0.1% from 400 to 900 K and to 2% at 1000 K. Equation (8) was integrated with respect to temperature, in order to obtain the perfect-gas part of the Helmholtz free energy

$$A^{\text{perf}}/A^{**} \equiv [A^{\text{mol}} - RT + \ln(V/\Lambda^3)]/A^{**} = [a_{-1} + a_0 T^{**}/T] \ln(T/T^{**}) + a_1 (T/T^{**})^2/2 \quad (9)$$

No effort was made to define a zero point for the thermodynamic functions of pure nitrogen (and, a fortiori, for the mixture). The absolute values of the enthalpies tabulated in this paper have no meaning; only their differences do. The ideal-gas enthalpy difference between 300 and 800 K, according to eq. 9, agrees with that of the full expression of Jacobsen and coworkers to better than 1 part in 20 000.

The critical parameters of nitrogen were taken from Ref. 23; they are listed in Table 1, and they were used to fix the constant ϕ_0 in the shape factor for volume as $z_{\text{N}_2}^c/z_w^c$, the ratio of the critical compressibility factors of nitrogen and water. No effort was made to represent the region of phase coexistence of pure nitrogen, since this region is irrelevant in the present application to mixtures rich in water at conditions in a region around the critical point of water. The shape factors were adjusted so as to represent pVT data of nitrogen at the high temperatures of interest here to within a few percent in density. A difficulty in this application of the generalized corresponding states model is that the properties of nitrogen at the high temperatures and high pressures typical of, for instance, the Japas and Franck data, are mapped to steam states that are in part out of the range of the NBS/NRC reference equation for water and steam. As a consequence, the representation of pure nitrogen properties, and of nitrogen-rich states, deteriorates at pressures above 50 MPa. We do not report property values for pressures above 50 MPa at $x = 0.8$ or higher. We have checked that enthalpy differences for pure nitrogen predicted by our model agree with those reported by Jacobsen and coworkers to 2% in the worst case, in the range of 400 to 800 K, and of 0 to 10 MPa.

After the choice of ϕ_0 , the next step was to try to fit the critical line data of Japas and Franck [7]. The techniques used for locating the critical line and the phase boundaries are described in Ref. 5. The parameters were varied, one or two at a time, in order to obtain a rough fit to the data. We experienced considerable difficulty. The measured critical line, starting at the critical point of water, moves through a shallow minimum in temperature, but the present model cannot reproduce this initial part of the critical line, and has an unphysical maximum temperature before it moves to temperatures below the critical temperature of steam. We have an indication that this is a feature of the model that occurs when the critical temperatures of the two components are far apart, and that it persists even when the shape factors are kept constant.

We did not press hard for a close representation of the critical line. Our prime interest was in the density and enthalpy in the homogeneous region; we have found that with the present form of the model, we could not fit this region well if we insisted on fitting the critical line.

The next step was a fit to the three sets of pVTx data, those of Japas and Franck [9], of Watson and Fenghour, and of Abdulagatov et al. [10]. We gave great emphasis to fitting the Watson-Fenghour data. First, parameters were varied in small groups. After an acceptable parameter set was obtained, further refinement of the parameter values was obtained by linearizing the fitting procedure around this set, as described in Ref. 7. In the linearization process, other properties, such as those representative of the critical line data, the solubility data of Alvarez et al.[12], and the excess enthalpy data of Wormald and Colling [14, 15] were included.

Excess enthalpies for mixtures at nitrogen mole fraction x were calculated by subtracting from the model enthalpy the mole fraction-averaged values of the enthalpy of water [12] and of the enthalpy of nitrogen, as predicted from our model. These calculations were performed at fixed temperature and pressure.

The final set of parameters for the model is listed in Table 1, Appendix A.

4. Comparison with the Experimental Data

4.1 PVTx Data

As explained in Section 2, there are three sets of PVTx data for nitrogen in water. The basis for our model was formed principally by those of Watson and Fenghour up to 30 MPa, and those of Abdulagatov et al. [10] up to 70 MPa. The data of Japas and Franck [9] were principally used to direct the high-pressure part of the model. We compare the measured pressures (well over 200 data points in this range) with the model prediction at given temperature, molar density and composition. The measured data, and the predicted values of the pressure, are listed in Tables 2a-c (Appendix A) for all data sources. The pressure differences, in %, are plotted versus pressure in figures 1a and 1b, versus nitrogen mole fraction in figure 1c, and versus temperature in figure 1d. Figure 1a shows the pressure departures in the range up to 45 MPa. We note, figure 1a, that the fit to the Watson-Fenghour data (Table 2a), in the range up to 30 MPa, is quite close, with a root-mean-square (rms) departure of 0.8% in pressure. The departures from the model are however, clearly systematic. The authors claim the uncertainty to be less than 0.2% in density, which would correspond with a similar uncertainty in in pressure. The rms of the fit is three times larger. There is no

indication of systematic differences between the three data sets in this plot, but one should realize that they cover different regions in pTx space. Figure 1b presents the pressure departures in % in the range up to 100 MPa for the Abdulagatov [10] and the Japas-Franck [9] data. We did not include the Watson-Fenghour data in Fig. 1b, because the resolution of this figure is too small. The rms pressure deviation of the Abdulagatov data is 1.4 % and that of the Japas-Franck data, which span only one isotherm, is 3.7 %. Pressure deviations paint an unflattering picture in the high-pressure incompressible states; the root-mean-square density departure of the Japas-Franck data is only 2.3%. In figure 1c, we note that the Watson-Fenghour data are fitted about equally well over the composition range from $x = 0.36$ up to $x = 0.8$. The Abdulagatov data, see Table 2b and figures 1a and 1b, are fitted without obvious systematics, but not within their estimated uncertainty of 0.2%: the root-mean square pressure deviation is 1.4%. One Abdulagatov point, the last point in Table I, Ref. 10, was more than 7% out and we did not include it in this work.

The Japas and Franck data, all at 673 K, (Table 2c and figures 1a-1d) are reasonably well fitted, be it not to within the claimed tolerance of 0.5 K, 0.1 MPa. They agree with the other data sets in regions of overlap. Only in figure 1c, where the data are plotted versus composition, some systematic departures from the model are noticeable, such as the data near $x = 0.35$. In the case of the data near $x = 0.35$, we note that they do agree with those of Abdulagatov in the range of overlap in pressure up to 60 MPa. so that the systematics are likely to be due to the model.

We conclude that our model has been able to fit the experimental $pVTx$ data within a tolerance of a few times the experimental uncertainty over the range of compositions up to 0.8 mole fraction of nitrogen, temperatures from 500 to 700 K, and pressure up to 70 MPa. The three sets of $PVTx$ data are in satisfactory agreement in the range of overlap, but do show some systematic departures from the model in the composition dependence.

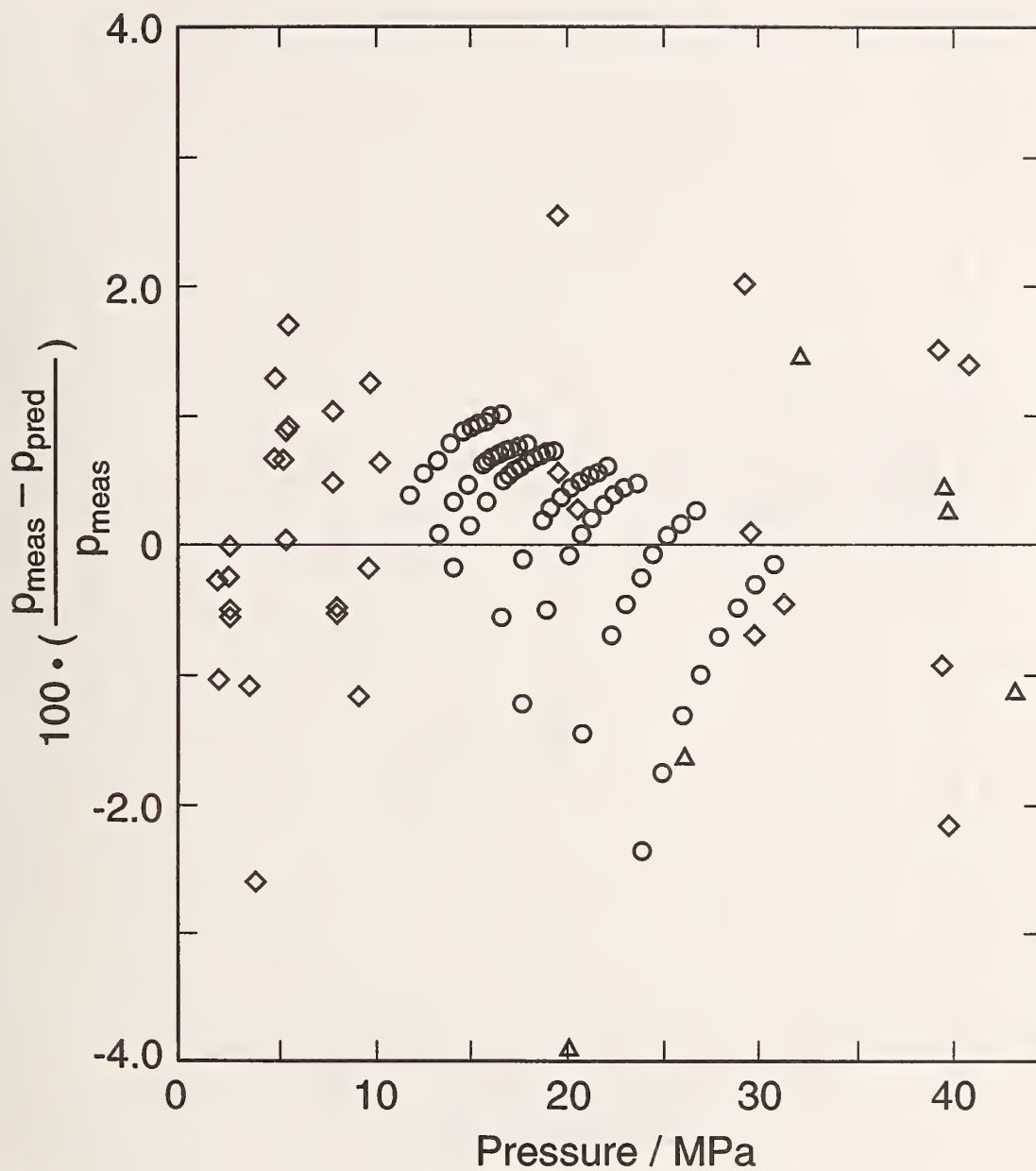


Figure 1a. The relative departures of the experimental pressures from the formulation in the pressure range up to 45 MPa. \circ Watson and Fenghour; \diamond Abdulagatov et al. [10]; Δ Japas and Franck [7].

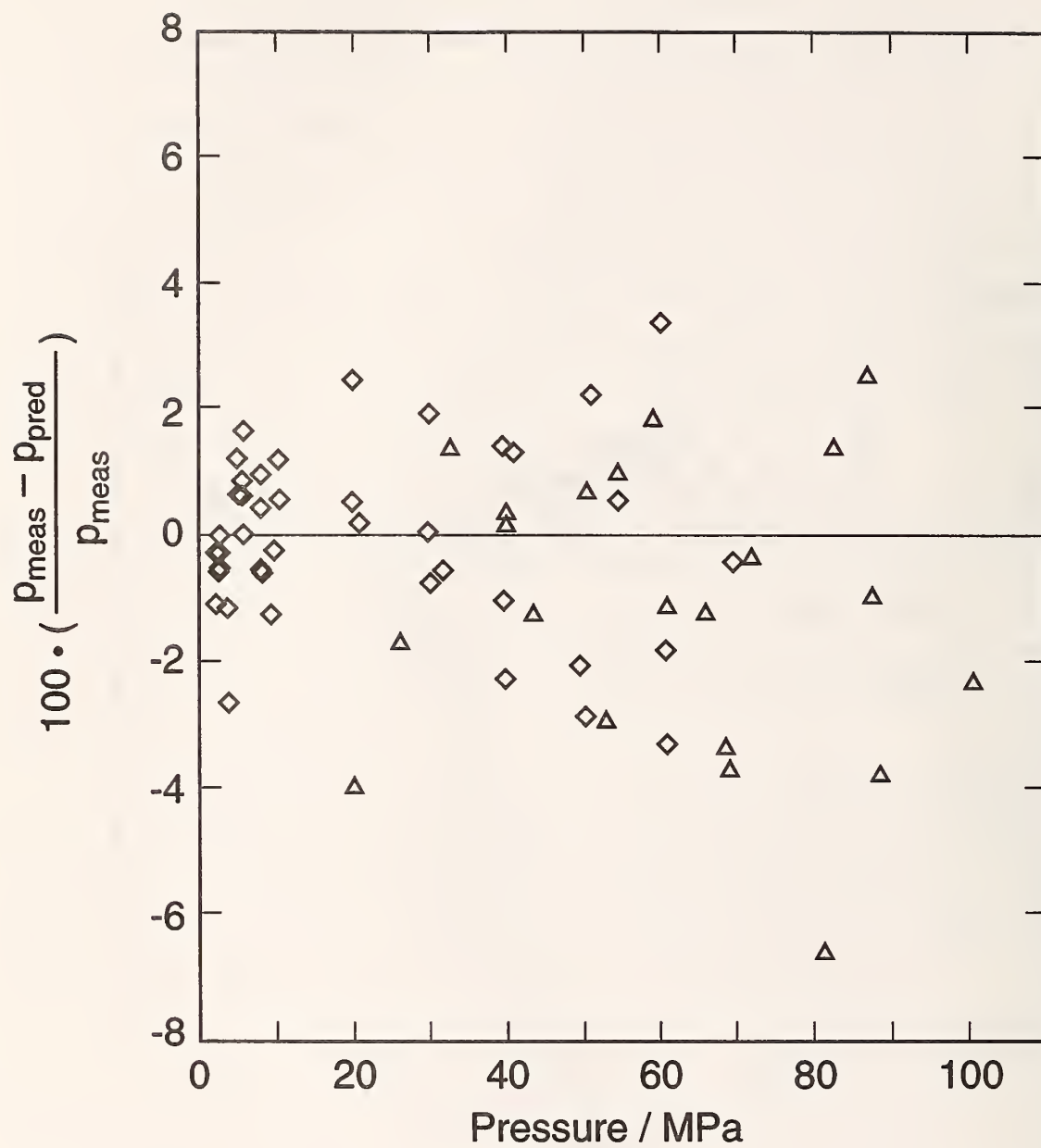


Figure 1b. The relative departures of the experimental densities from the formulation in the range up to 100 MPa. \diamond Abdulagatov et al. [10], Δ Japas and Franck [7]

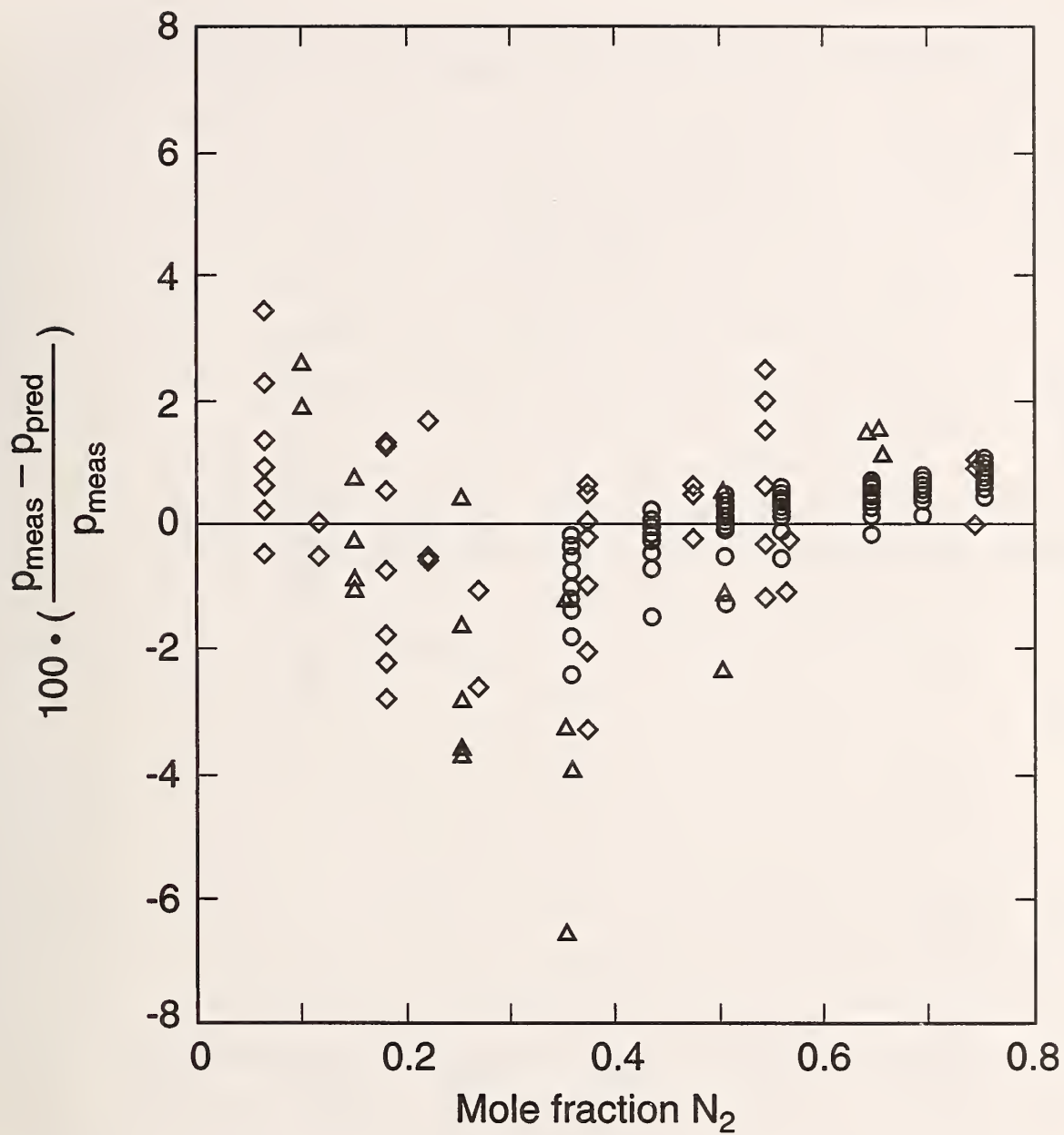


Figure 1c. The relative departures of the experimental pressures from the formulation, in the range up to 0.8 mole fraction of nitrogen. \circ Watson and Fenghour; \diamond Abdulagatov et al. [10]; \triangle Japas and Franck [9].

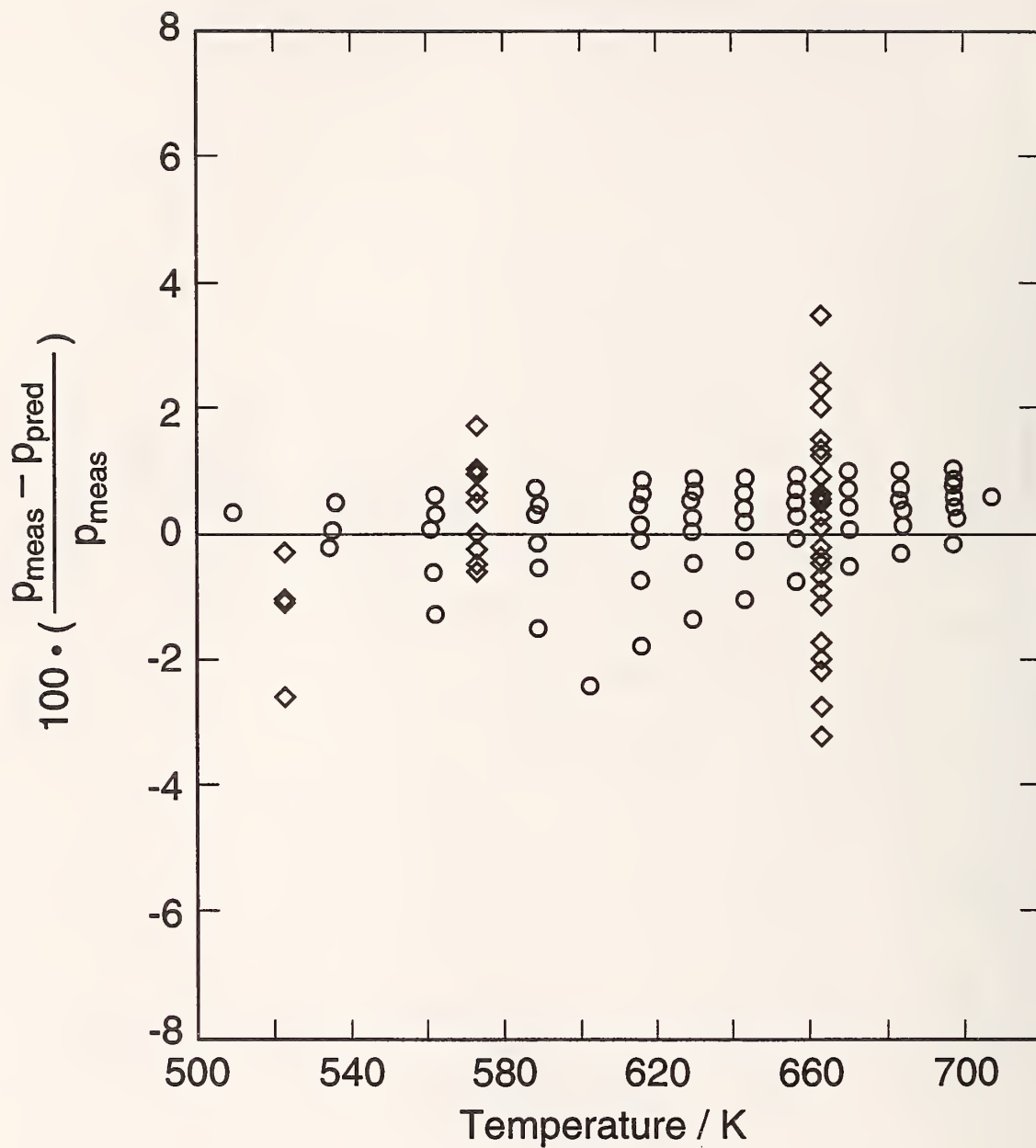


Figure 1d. The relative departures of the experimental pressures from the formulation, plotted as a function of temperature in the range 500-700 K. \circ Watson and Fenghour; \diamond Abdulagatov et al. [10]

4.2 Solubility Data

We have fitted the model to the directly measured solubility data of Alvarez et al. [10], which represent the composition of the liquid phase at coexistence, at nitrogen mole fractions generally below 0.01. As is evident from Table 3, Appendix A, our model fits these compositions generally within a few percent in the range from 460 to 636 K. Alvarez et al. give no estimate of the uncertainty of their measured mole fractions; in an earlier paper [25] from the same group, however, the reproducibility of the composition measurement was quoted as 0.5%. Alvarez et al., in various ways, [12, 13] calculated Henry's constants from these measured mole fractions. This calculation requires extrapolation to infinite dilution, which these authors achieved by making corrections based on molecular theory for departures from perfect-gas behavior in the vapor phase, and from mixture nonideality in the liquid phase. Especially the latter correction, which is applied to the activity coefficient of the liquid, is difficult to make, and becomes both substantial and uncertain as the critical point is approached [26]. A (classical) Helmholtz free energy model extrapolates simply to infinite dilution even near a critical point, without the critical anomalies peculiar to activity coefficients based on infinite-dilution reference states [26].

Henry's constant, defined as

$$k_H = \lim_{x \rightarrow 0} f_2/x_2 \quad (10)$$

with f_2 the fugacity, x_2 ($\equiv x$) the mole fraction of the solute, nitrogen, is readily obtained from our model by calculating, at the given temperature and at a pressure slightly above the saturation pressure of pure water, the limiting value of f_2 as x_2 approaches the value 0. In practice, the limiting value is always reached for $x < 10^{-4}$, but we have used $x = 10^{-5}$ to be on the safe side. Figure 2 displays the two differently corrected sets of Henry constant data published by Alvarez et al. [12, 13], compared with our model calculation. We have used the linearized representation proposed by Japas and Levelt Sengers [27], and by Harvey and Levelt Sengers [28]. This representation was proposed because theory predicts it should be asymptotically linear near the solvent's critical point [27]. Later, Harvey et al. showed [28] that the slope of the straight line in the representation of figure. 2, observed over the full range of temperatures from the normal boiling point of water through the range of the original set of Henry's constants by Alvarez et al. [12], was larger than what was expected for the asymptotic slope. This asymptotic slope can be estimated from a variety of properties such as the

initial slopes of the critical line in p - x and T - x space, or the limiting slope of the distribution coefficient or K factor [27-30]. The estimates from the critical-line slope [29] and from the distribution coefficient [29] are included in figure 2. This figure, and also Table 3, show that our model represents the Henry constants of Alvarez et al. quite well in the range of intermediate temperatures (the higher liquid densities). Below 440 K departures are systematic. At the high temperatures approaching the critical point, (low densities), the model shows the expected decline of the slope towards the asymptotic value calculated independently from the critical-line slope and distribution coefficient [29]. Our model is very insensitive to the choice of parameters at temperatures above 600 K, so that there is little uncertainty about the location of the model curve. We suggest that at the high temperatures the first set of Henry's constants of Alvarez et al. [12] may have been undercorrected, and the second set [11] overcorrected.

Japas and Franck [7] also reported Henry constant data derived from their two-phase measurements at saturation. They recognized the difficulty of correcting for departure from ideality, and therefore claim no more than qualitative features of their Henry's constants. We have therefore omitted their data from figure. 2.

4.3 Excess Enthalpies

The comparison of our model predictions with the excess enthalpies of Wormald and Colling [14, 15] is shown in figure.3. Note that these data were not included in the fit. From the enthalpy calculated for the mixture of the experimental composition at given pressure and temperature, we subtracted the mole-fraction-weighted enthalpies of pure steam and that of the model prediction for pure nitrogen at the same pressure and temperature. We obtain a quite satisfactory representation of these data. Since we also fit the PVT x data well in the range of Wormald's measurements, we have established consistency between the accurate PVT x and excess enthalpy data in the range of overlap.

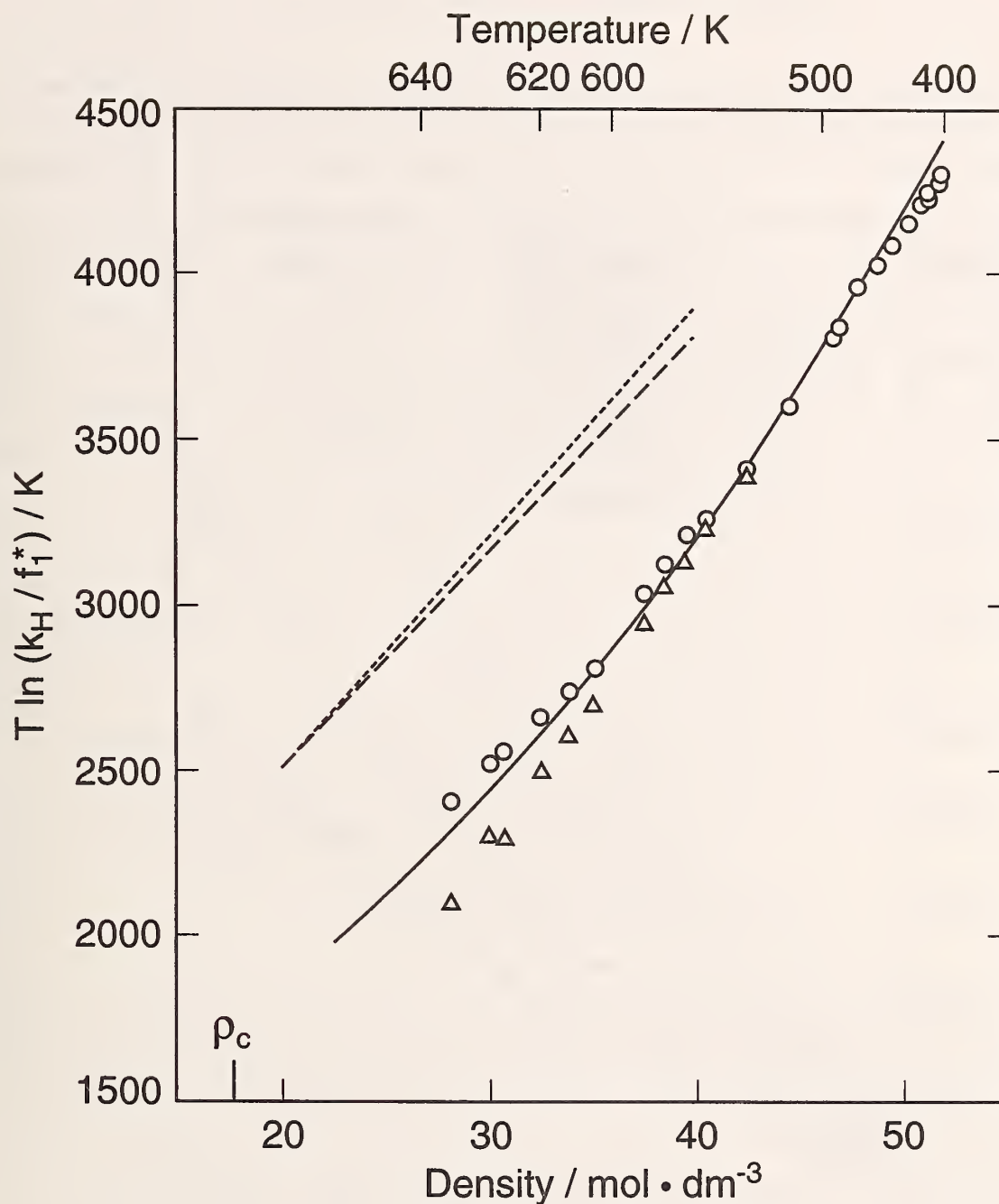


Figure 2. Henry's constant in the "linearized" representation of Refs 27-29. Data of Alvarez et al. corrected for nonideality in two different ways O Ref. 12; Δ Ref. 13. The limiting slope as calculated from the critical line is indicated by the short-dashed line, and that from the distribution coefficient by the long-dashed line [28, 29].

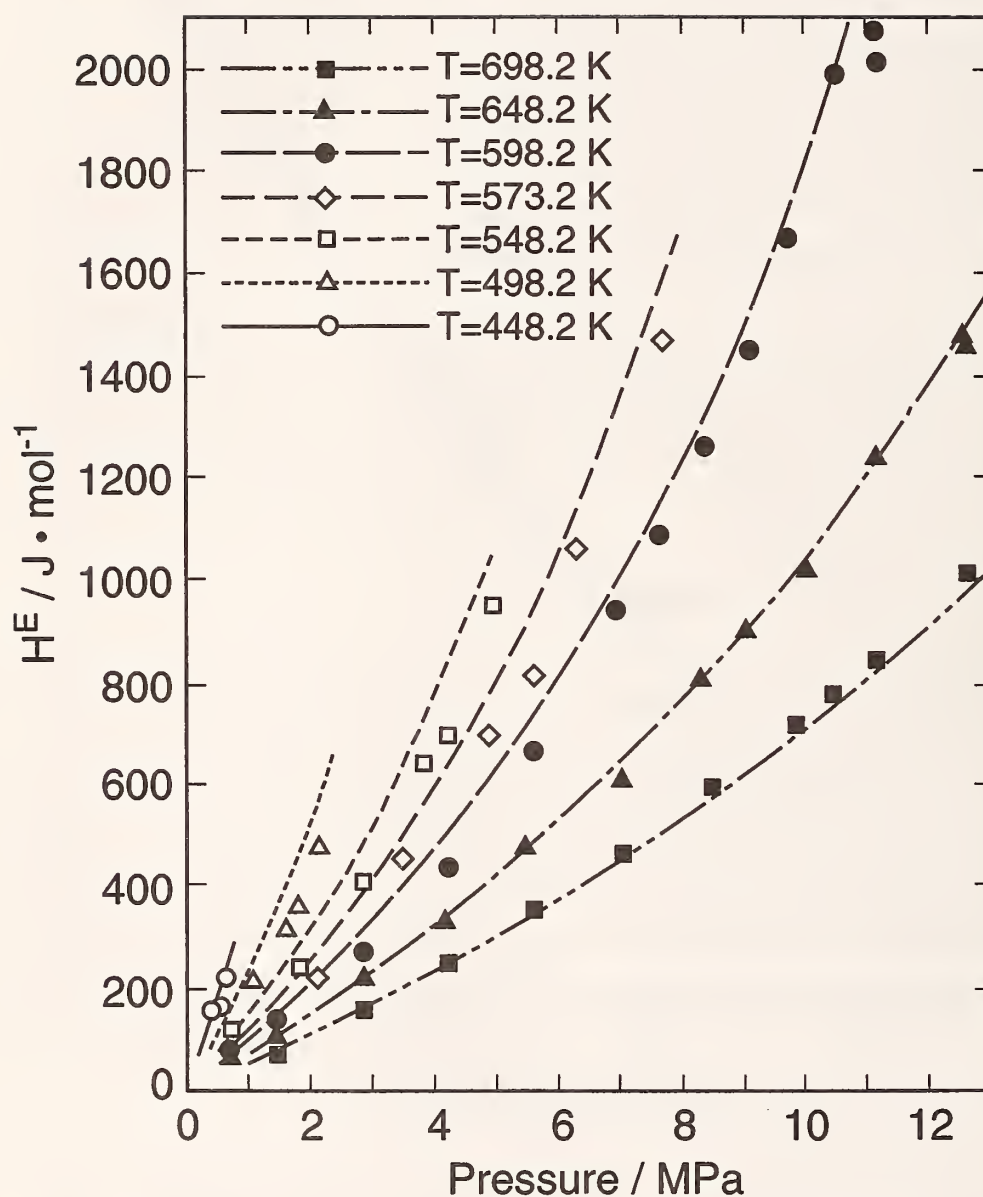


Figure 3. Excess enthalpies of equimolar nitrogen in water as a function of pressure. Data points of Wormald and Colling, Refs 12 and 13. Curves: prediction of the model.

5. Tabulation of the Thermodynamic Properties

The model for the Helmholtz free energy has been used to generate thermodynamic properties in tabular form. In Table 4, Appendix A, we present values for the molar volume V , the molar enthalpy H , and the fugacity coefficients ϕ_1 and ϕ_2 of the two components in the homogeneous phase, as functions of temperature, for chosen values of pressure and composition. There are six compositions from $x = 0.05$ to $x = 0.8$. Forty pressure entries are given, in the range from 0.05 to 100 MPa. The temperatures are in the range from 440 to 1000 K. The absolute values of the enthalpy have no special significance; only enthalpy differences are meaningful. There are no experimental data above 700 K, and we have indicated this boundary of experimental verification by the dashed lines in the table.

In Table 5, Appendix A, we list the infinite-dilution values or standard states for the solute nitrogen in water for the same values of pressure and temperature as in Table 4. Table 5 includes values at the (pure-water) phase boundaries; these values are indicated in italics. We present infinite-dilution values for the partial molar volume V_2 , the partial molar enthalpy H_2 , the partial molar heat capacity C_{p2} and the fugacity coefficient ϕ_2 of the solute.

The FORTRAN programs that were used to generate the results in Tables 2 - 5 are those listed in Ref. 7. The part of the computer program containing the input data necessary for the present application is listed in Appendix B.

6. Range and Reliability of the Model

We have set the range limitations on the model by the following considerations. With the application to relatively dilute aqueous mixtures in mind, and given the fact that there is only one reference fluid, pure water, we had anticipated a region of application roughly comparable with that of the carbon dioxide-water system [7], where the upper mole fraction was 35% of solute. The good fit to the PVT x and excess enthalpy data, even at high nitrogen mole fractions, came as somewhat of a surprise. Since we had made no great effort to fit the model to pure nitrogen data, we decided to define the upper limit of the composition range as $x = 0.8$. Even beyond that composition, the model will give reasonable values for one-phase properties. It is our expectation that in the range where there are data, the uncertainty in the density will mostly be no larger than 2%. Since we predict measured excess enthalpies at temperatures near and above the critical point of steam to within a few percent, we are confident that excess

enthalpies in the range where the PVTx fit is accurate (pressures up to 70 MPa), will be of comparable reliability. The temperature range has been set by the range needed in applications envisioned for SCWO. It should be strongly emphasized that there are no experimental data for the mixture above 700 K. Above this temperature, however, the model predictions appear well-behaved; moreover, even at 100 MPa, the density is still in a regime that has only moderate departures from the perfect-gas state. Nevertheless, above 700 K, our tables have no experimental support and should therefore be considered as giving estimates rather than verified predictions.

Contrary to the application to the carbon dioxide - water system, we have not been able to generate an acceptable critical line or reasonable phase boundaries. The model should therefore not be used for states near the critical line, and for calculation of phase boundaries. By applying the model within the boundaries of Table 4, no regions of poor or unacceptable behavior will be entered.

As a lower cut-off for the temperature, we have chosen 440 K because we have evidence from the Henry constant data that below this temperature the model becomes inadequate (Table 3). The shape factors have simple forms centered on the critical point of water, and accuracy must decline at large distances from this point.

7. Conclusions

We have presented a Helmholtz free energy formulation for the thermodynamic properties of the system nitrogen in water, for application in a large range of temperatures and pressures around the critical point of water.

The strong features of our model are the following. Since the model uses the full Helmholtz free energy of water and steam as a reference, it is accurate in dilute aqueous phases and can be used to obtain infinite-dilution limits or standard states of the solute. We have relied heavily on three sets of pVTx data in the near-critical and supercritical regime that we have proven to be mutually consistent. One of these sets is as yet unpublished. We therefore produce densities and enthalpies that are accurate in supercritical phases. This goal is difficult to achieve on the basis of commonly used engineering equations of the cubic type, or by existing scientific models for fluid mixtures. It is very difficult to represent the properties of pure water with such equations and models. A particular problem in representing the supercritical region is the very low value of the critical compressibility factor of water, $z^C = 0.23$. Few-parameter models usually have z^C values well over 0.3. If such models fit the

ritical temperature and pressure of water, densities in the supercritical regime will be 30% or more in error.

There is much speculation in the literature on supercritical fluids about the possible size of nonideality corrections in the dilute aqueous mixtures encountered in applications such as SCWO. Our model gives the most accurate estimates presently available for such systems.

The model fits the solubilities of nitrogen measured near the water vapor pressure curve accurately. It is a trivial effort to deduce the Henry constant from a Helmholtz free energy model, even at temperatures near the critical point. This is an alternative to making the large corrections for vapor imperfections and mixture nonidealities near the water critical point by means of approximate theoretical models.

A weakness of the present formulation is the poor location of the critical line and the phase boundaries. We are presently investigating whether this is an inherent feature of the model when the critical points of the two components are far apart, or whether a better choice of parameters or of interpolation equations can cure this problem. Our experience has alerted us to the fact that the phase behavior of generalized corresponding-states models has not been systematically explored. In view of the many new phase features displayed by equations-of-state of somewhat greater complexity [31] than 2- and 3-parameter cubic equations, such an exploration seems urgently needed.

8. Acknowledgments

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APPENDIX A. Tables

Model parameters, comparisons with experimental data,
and tabulations of thermodynamic properties of mixtures of nitrogen and water.

Table 1

The Values of the Parameters in the Helmholtz Free Energy

Nitrogen

| Critical parameters [21] | | Heat capacity parameters, eq. (7) | |
|--------------------------|--------------------------------------|-----------------------------------|---|
| T_c | 126.2 K (IPTS-68) | a_{-1} | 0.576564 |
| P_c | 3.40 MPa | a_0 | 8.26099 |
| ρ_c | $311 \text{ kg} \cdot \text{m}^{-3}$ | a_1 | 2.58261 |
| | | S^{**} | $1.937034 \text{ J} \cdot \text{K}^{-1} \text{ mol}^{-1}$ |

Mixture

| | | | |
|---------------|--------|-----|-------|
| ϕ_0 | 1.253 | j | 0.978 |
| ϕ_V | -0.125 | k | 1.233 |
| ϕ_T | -0.051 | | |
| ϕ_{VT} | 0.067 | | |
| θ_V | -0.012 | | |
| θ_T | 0.018 | | |
| θ_{VT} | -0.124 | | |

Table 2a
pVTx measurements of Watson and Fenghour
At given x, T and ρ , measured and calculated pressures are compared

| x(N ₂) | T K | ρ_{meas} mol dm ⁻³ | p _{meas} MPa | p _{calc} MPa | 100 (p _{meas} -p _{calc})/p |
|--------------------|--------|--|--------------------------|--------------------------|---|
| 0.3593 | 602.47 | 5.9063 | 24.093 | 24.6668 | -2.38 |
| 0.3593 | 615.86 | 5.9018 | 25.133 | 25.5812 | -1.78 |
| 0.3593 | 629.27 | 5.8973 | 26.140 | 26.4878 | -1.33 |
| 0.3593 | 642.94 | 5.8924 | 27.127 | 27.4021 | -1.01 |
| 0.3593 | 656.21 | 5.8879 | 28.078 | 28.2824 | -0.73 |
| 0.3593 | 670.04 | 5.8834 | 29.049 | 29.1933 | -0.50 |
| 0.3593 | 683.69 | 5.8785 | 29.986 | 30.0823 | -0.32 |
| 0.3593 | 697.44 | 5.8737 | 30.919 | 30.9707 | -0.17 |
| 0.4358 | 589.02 | 4.8731 | 20.961 | 21.2692 | -1.47 |
| 0.4358 | 615.91 | 4.8657 | 22.517 | 22.6786 | -0.72 |
| 0.4358 | 629.35 | 4.8622 | 23.267 | 23.3749 | -0.46 |
| 0.4358 | 642.88 | 4.8584 | 24.007 | 24.0693 | -0.26 |
| 0.4358 | 656.59 | 4.8544 | 24.746 | 24.7667 | -0.08 |
| 0.4358 | 670.56 | 4.8504 | 25.487 | 25.4723 | 0.06 |
| 0.4358 | 684.11 | 4.8466 | 26.190 | 26.1524 | 0.14 |
| 0.4358 | 697.87 | 4.8426 | 26.903 | 26.8374 | 0.24 |
| 0.5069 | 562.16 | 4.1959 | 17.859 | 18.0765 | -1.22 |
| 0.5069 | 589.20 | 4.1895 | 19.147 | 19.2456 | -0.52 |
| 0.5069 | 615.95 | 4.1832 | 20.367 | 20.3847 | -0.09 |
| 0.5069 | 629.39 | 4.1801 | 20.964 | 20.9511 | 0.06 |
| 0.5069 | 643.08 | 4.1768 | 21.566 | 21.5236 | 0.20 |
| 0.5069 | 656.71 | 4.1734 | 22.155 | 22.0899 | 0.29 |
| 0.5069 | 670.43 | 4.1701 | 22.740 | 22.6564 | 0.37 |
| 0.5069 | 683.88 | 4.1668 | 23.305 | 23.2081 | 0.42 |
| 0.5069 | 697.51 | 4.1635 | 23.875 | 23.7642 | 0.46 |
| 0.5606 | 561.97 | 3.7936 | 16.761 | 16.8573 | -0.57 |
| 0.5606 | 588.99 | 3.7879 | 17.856 | 17.8751 | -0.11 |
| 0.5606 | 615.92 | 3.7821 | 18.909 | 18.8762 | 0.17 |
| 0.5606 | 629.33 | 3.7793 | 19.422 | 19.3701 | 0.27 |
| 0.5606 | 642.93 | 3.7764 | 19.940 | 19.8682 | 0.36 |
| 0.5606 | 656.47 | 3.7734 | 20.448 | 20.3600 | 0.43 |
| 0.5606 | 670.10 | 3.7705 | 20.953 | 20.8530 | 0.48 |
| 0.5606 | 683.04 | 3.7676 | 21.429 | 21.3185 | 0.52 |
| 0.5606 | 697.42 | 3.7645 | 21.956 | 21.8333 | 0.56 |
| 0.5606 | 706.65 | 3.7624 | 22.292 | 22.1616 | 0.59 |
| 0.6467 | 534.71 | 3.2939 | 14.253 | 14.2786 | -0.18 |
| 0.6467 | 561.33 | 3.2891 | 15.137 | 15.1174 | 0.13 |
| 0.6467 | 588.44 | 3.2843 | 16.015 | 15.9619 | 0.33 |
| 0.6467 | 615.39 | 3.2793 | 16.877 | 16.7920 | 0.50 |
| 0.6467 | 628.75 | 3.2769 | 17.299 | 17.2002 | 0.57 |
| 0.6467 | 642.34 | 3.2743 | 17.722 | 17.6132 | 0.61 |
| 0.6467 | 656.10 | 3.2717 | 18.147 | 18.0296 | 0.65 |
| 0.6467 | 670.06 | 3.2690 | 18.576 | 18.4497 | 0.68 |
| 0.6467 | 683.69 | 3.2665 | 18.990 | 18.8583 | 0.69 |
| 0.6467 | 697.41 | 3.2638 | 19.407 | 19.2673 | 0.72 |
| 0.6962 | 535.69 | 3.0593 | 13.520 | 13.5084 | 0.09 |
| 0.6962 | 562.22 | 3.0549 | 14.312 | 14.2664 | 0.32 |
| 0.6962 | 589.32 | 3.0503 | 15.102 | 15.0320 | 0.46 |
| 0.6962 | 616.29 | 3.0457 | 15.884 | 15.7872 | 0.61 |
| 0.6962 | 629.67 | 3.0434 | 16.267 | 16.1591 | 0.66 |
| 0.6962 | 643.14 | 3.0411 | 16.647 | 16.5319 | 0.69 |
| 0.6962 | 656.72 | 3.0387 | 17.027 | 16.9058 | 0.71 |
| 0.6962 | 669.98 | 3.0364 | 17.398 | 17.2703 | 0.73 |
| 0.6962 | 683.18 | 3.0341 | 17.763 | 17.6311 | 0.74 |
| 0.6962 | 697.43 | 3.0315 | 18.158 | 18.0185 | 0.77 |

Table 2a. (cont.) pVTx measurements of Watson and Fenghour

| $x(N_2)$ | T K | ρ_{meas} mol dm ⁻³ | P_{meas} MPa | P_{calc} MPa | $100 (p_{\text{meas}} - p_{\text{calc}})/p$ |
|----------|--------|--|--------------------------|--------------------------|---|
| 0.7545 | 509.74 | 2.8271 | 12.017 | 11.9708 | 0.38 |
| 0.7545 | 536.34 | 2.8230 | 12.732 | 12.6622 | 0.55 |
| 0.7545 | 562.14 | 2.8190 | 13.413 | 13.3263 | 0.65 |
| 0.7545 | 588.65 | 2.8149 | 14.112 | 14.0026 | 0.78 |
| 0.7545 | 615.98 | 2.8106 | 14.822 | 14.6940 | 0.86 |
| 0.7545 | 629.55 | 2.8085 | 15.170 | 15.0353 | 0.89 |
| 0.7545 | 643.04 | 2.8063 | 15.514 | 15.3727 | 0.91 |
| 0.7545 | 656.84 | 2.8041 | 15.866 | 15.7169 | 0.94 |
| 0.7545 | 669.80 | 2.8020 | 16.200 | 16.0387 | 1.00 |
| 0.7545 | 683.25 | 2.7998 | 16.538 | 16.3716 | 1.01 |
| 0.7545 | 697.31 | 2.7975 | 16.891 | 16.7184 | 1.02 |
| 0.8148 | 482.99 | 2.6214 | 10.629 | 10.5868 | 0.40 |
| 0.8148 | 509.43 | 2.6177 | 11.281 | 11.2151 | 0.58 |
| 0.8148 | 535.60 | 2.6140 | 11.922 | 11.8313 | 0.76 |
| 0.8148 | 562.23 | 2.6103 | 12.558 | 12.4534 | 0.83 |
| 0.8148 | 589.01 | 2.6064 | 13.191 | 13.0737 | 0.89 |
| 0.8148 | 616.22 | 2.6025 | 13.842 | 13.6995 | 1.03 |
| 0.8148 | 629.69 | 2.6004 | 14.156 | 14.0072 | 1.05 |
| 0.8148 | 643.33 | 2.5985 | 14.474 | 14.3183 | 1.08 |
| 0.8148 | 656.88 | 2.5960 | 14.787 | 14.6226 | 1.11 |
| 0.8148 | 670.59 | 2.5944 | 15.104 | 14.9352 | 1.12 |
| 0.8148 | 684.21 | 2.5924 | 15.417 | 15.2424 | 1.13 |
| 0.8148 | 697.89 | 2.5903 | 15.731 | 15.5497 | 1.15 |
| 0.8897 | 456.21 | 2.4040 | 9.2810 | 9.2410 | 0.43 |
| 0.8897 | 483.09 | 2.4007 | 9.8750 | 9.8170 | 0.59 |
| 0.8897 | 509.42 | 2.3974 | 10.4530 | 10.3765 | 0.73 |
| 0.8897 | 535.46 | 2.3940 | 11.0220 | 10.9256 | 0.87 |
| 0.8897 | 562.15 | 2.3906 | 11.5930 | 11.4848 | 0.93 |
| 0.8897 | 589.07 | 2.3870 | 12.1680 | 12.0447 | 1.01 |
| 0.8897 | 615.71 | 2.3834 | 12.7460 | 12.5950 | 1.18 |
| 0.8897 | 642.91 | 2.3798 | 13.3190 | 13.1532 | 1.24 |
| 0.8897 | 656.49 | 2.3780 | 13.6040 | 13.4308 | 1.27 |
| 0.8897 | 670.08 | 2.3761 | 13.8870 | 13.7075 | 1.29 |
| 0.8897 | 683.77 | 2.3742 | 14.1730 | 13.9852 | 1.32 |
| 0.8897 | 697.28 | 2.3723 | 14.4530 | 14.2592 | 1.34 |
| 0.9501 | 428.74 | 2.2544 | 8.2080 | 8.1734 | 0.42 |
| 0.9501 | 455.80 | 2.2513 | 8.7600 | 8.7117 | 0.55 |
| 0.9501 | 482.37 | 2.2482 | 9.3020 | 9.2362 | 0.71 |
| 0.9501 | 508.96 | 2.2451 | 9.8440 | 9.7575 | 0.88 |
| 0.9501 | 535.25 | 2.2419 | 10.3740 | 10.2692 | 1.01 |
| 0.9501 | 562.08 | 2.2386 | 10.9090 | 10.7886 | 1.10 |
| 0.9501 | 589.05 | 2.2353 | 11.4500 | 11.3069 | 1.25 |
| 0.9501 | 616.06 | 2.2319 | 11.9890 | 11.8231 | 1.38 |
| 0.9501 | 642.97 | 2.2285 | 12.5160 | 12.3340 | 1.45 |
| 0.9501 | 670.10 | 2.2250 | 13.0440 | 12.8461 | 1.52 |
| 0.9501 | 697.22 | 2.2216 | 13.5700 | 13.3554 | 1.58 |

rms % deviation 0.85

Table 2b
pVTx measurements of Abdulagatov et al. [10]
At given x, T and ρ , measured and calculated pressures are compared

| $x(N_2)$ | T K | ρ_{meas} mol dm ⁻³ | p_{meas} MPa | p_{calc} MPa | $100(p_{\text{meas}}-p_{\text{calc}})/p$ |
|----------|--------|--|--------------------------|--------------------------|--|
| 0.0654 | 663.15 | 27.108 | 59.83 | 57.757 | 3.47 |
| 0.0654 | 663.15 | 24.510 | 50.81 | 49.637 | 2.31 |
| 0.0654 | 663.15 | 19.732 | 40.99 | 40.431 | 1.36 |
| 0.0654 | 663.15 | 12.356 | 31.53 | 31.679 | -0.47 |
| 0.0654 | 663.15 | 5.453 | 20.68 | 20.629 | 0.25 |
| 0.0654 | 663.15 | 2.191 | 10.45 | 10.385 | 0.63 |
| 0.0654 | 663.15 | 1.087 | 5.62 | 5.569 | 0.91 |
| 0.1814 | 663.15 | 18.262 | 60.04 | 61.698 | -2.76 |
| 0.1814 | 663.15 | 15.103 | 49.68 | 51.062 | -2.78 |
| 0.1814 | 663.15 | 11.493 | 39.86 | 40.731 | -2.19 |
| 0.1814 | 663.15 | 7.650 | 29.83 | 30.046 | -0.72 |
| 0.1814 | 663.15 | 4.418 | 19.79 | 19.679 | 0.56 |
| 0.1814 | 663.15 | 1.977 | 10.00 | 9.875 | 1.25 |
| 0.1814 | 663.15 | 0.948 | 5.05 | 4.985 | 1.28 |
| 0.3738 | 663.15 | 12.625 | 60.80 | 62.776 | -3.25 |
| 0.3738 | 663.15 | 10.340 | 49.43 | 50.423 | -2.01 |
| 0.3738 | 663.15 | 8.211 | 39.55 | 39.929 | -0.96 |
| 0.3738 | 663.15 | 6.009 | 29.64 | 29.616 | 0.08 |
| 0.3738 | 663.15 | 3.876 | 19.76 | 19.651 | 0.55 |
| 0.3738 | 663.15 | 1.867 | 9.82 | 9.839 | -0.19 |
| 0.3738 | 663.15 | 0.933 | 5.06 | 5.026 | 0.67 |
| 0.5456 | 663.15 | 11.635 | 69.28 | 69.512 | -0.33 |
| 0.5456 | 663.15 | 9.432 | 54.21 | 53.877 | 0.61 |
| 0.5456 | 663.15 | 7.021 | 39.40 | 38.816 | 1.48 |
| 0.5456 | 663.15 | 5.308 | 29.57 | 28.979 | 2.00 |
| 0.5456 | 663.15 | 3.540 | 19.74 | 19.240 | 2.53 |
| 0.5456 | 663.15 | 1.742 | 9.39 | 9.500 | -1.17 |
| 0.1173 | 573.15 | 2.100 | 8.16 | 8.200 | -0.50 |
| 0.1173 | 573.15 | 1.318 | 5.56 | 5.558 | 0.03 |
| 0.1173 | 573.15 | 0.573 | 2.58 | 2.593 | -0.52 |
| 0.2219 | 573.15 | 1.977 | 8.17 | 8.214 | -0.54 |
| 0.2219 | 573.15 | 1.290 | 5.72 | 5.623 | 1.70 |
| 0.2219 | 573.15 | 0.568 | 2.58 | 2.605 | -0.97 |
| 0.4761 | 573.15 | 1.756 | 8.04 | 8.001 | 0.49 |
| 0.4761 | 573.15 | 1.190 | 5.53 | 5.494 | 0.65 |
| 0.4761 | 573.15 | 0.553 | 2.59 | 2.596 | -0.25 |
| 0.7460 | 573.15 | 1.653 | 8.00 | 7.908 | 1.15 |
| 0.7460 | 573.15 | 1.150 | 5.54 | 5.491 | 0.89 |
| 0.7460 | 573.15 | 0.546 | 2.60 | 2.600 | -0.02 |
| 0.8821 | 573.15 | 6.200 | 32.96 | 32.445 | 1.56 |
| 0.8821 | 573.15 | 4.814 | 24.84 | 24.522 | 1.28 |
| 0.8821 | 573.15 | 3.368 | 16.91 | 16.746 | 0.97 |
| 0.8821 | 573.15 | 2.090 | 10.11 | 10.199 | -0.88 |
| 0.8821 | 573.15 | 1.073 | 5.07 | 5.168 | -1.94 |
| 0.2684 | 523.15 | 1.000 | 3.92 | 4.022 | -2.61 |
| 0.2684 | 523.15 | 0.502 | 2.08 | 2.102 | -1.05 |
| 0.5660 | 523.15 | 0.849 | 3.58 | 3.619 | -1.09 |
| 0.5660 | 523.15 | 0.490 | 2.11 | 2.106 | 0.20 |
| 0.8523 | 523.15 | 0.814 | 3.54 | 3.555 | -0.41 |
| 0.9415 | 523.15 | 3.525 | 16.32 | 16.072 | 1.52 |
| 0.9415 | 523.15 | 2.658 | 11.97 | 11.951 | 0.16 |
| 0.9415 | 523.15 | 1.830 | 8.06 | 8.131 | -0.88 |
| 0.9415 | 523.15 | 0.955 | 4.09 | 4.196 | -2.58 |

rms % deviation 1.45

Table 2c
pVTx measurements of Japas and Franck [9]
At given x, T and ρ , measured and calculated pressures are compared

| x(N ₂) | T | ρ_{meas} | p _{meas} | p _{calc} | 100(p _{meas} -p _{calc})/p |
|--------------------|-------|----------------------|-------------------|-------------------|--|
| | K | mol dm ³ | MPa | MPa | |
| 0.1000 | 673.0 | 40.0481 | 256.30 | 248.200 | 3.16 |
| 0.1000 | 673.0 | 37.0645 | 190.70 | 186.098 | 2.41 |
| 0.1000 | 673.0 | 34.5423 | 149.90 | 146.538 | 2.24 |
| 0.1000 | 673.0 | 27.9799 | 86.40 | 84.130 | 2.63 |
| 0.1005 | 673.0 | 21.9539 | 58.90 | 57.770 | 1.92 |
| 0.1505 | 673.0 | 36.5898 | 233.60 | 229.467 | 1.77 |
| 0.1505 | 673.0 | 33.2116 | 171.10 | 170.296 | 0.47 |
| 0.1505 | 673.0 | 29.6209 | 125.90 | 125.813 | 0.07 |
| 0.1510 | 673.0 | 24.8447 | 87.20 | 87.974 | -0.89 |
| 0.1510 | 673.0 | 21.7865 | 71.80 | 71.987 | -0.26 |
| 0.1510 | 673.0 | 19.1241 | 60.80 | 61.441 | -1.05 |
| 0.1510 | 673.0 | 15.3610 | 50.20 | 49.806 | 0.78 |
| 0.2550 | 673.0 | 5.7637 | 26.20 | 26.628 | -1.64 |
| 0.2530 | 673.0 | 9.1743 | 39.70 | 39.531 | 0.43 |
| 0.2520 | 673.0 | 12.9550 | 52.70 | 54.173 | -2.80 |
| 0.2520 | 673.0 | 16.6861 | 68.70 | 71.167 | -3.59 |
| 0.2510 | 673.0 | 20.2388 | 88.30 | 91.567 | -3.70 |
| 0.2510 | 673.0 | 23.5960 | 113.00 | 117.405 | -3.90 |
| 0.2510 | 673.0 | 26.6738 | 144.30 | 148.930 | -3.21 |
| 0.2510 | 673.0 | 28.1611 | 173.80 | 167.571 | 3.58 |
| 0.2510 | 673.0 | 31.5956 | 217.70 | 220.983 | -1.51 |
| 0.2510 | 673.0 | 34.2818 | 275.50 | 274.542 | 0.35 |
| 0.3510 | 673.0 | 30.0300 | 246.20 | 257.929 | -4.76 |
| 0.3510 | 673.0 | 27.6319 | 204.80 | 213.302 | -4.15 |
| 0.3510 | 673.0 | 26.0960 | 179.80 | 188.621 | -4.91 |
| 0.3510 | 673.0 | 22.9358 | 136.00 | 146.258 | -7.54 |
| 0.3520 | 673.0 | 21.0926 | 118.50 | 126.346 | -6.62 |
| 0.3520 | 673.0 | 16.3934 | 81.00 | 86.262 | -6.50 |
| 0.3530 | 673.0 | 13.9919 | 68.40 | 70.614 | -3.24 |
| 0.3540 | 673.0 | 8.9767 | 43.30 | 43.807 | -1.17 |
| 0.3590 | 673.0 | 4.0783 | 20.10 | 20.882 | -3.89 |
| 0.5020 | 673.0 | 26.3505 | 254.70 | 259.776 | -1.99 |
| 0.5020 | 673.0 | 24.3250 | 212.80 | 219.469 | -3.13 |
| 0.5020 | 673.0 | 21.4179 | 164.50 | 171.119 | -4.02 |
| 0.5030 | 673.0 | 18.6289 | 127.80 | 133.898 | -4.77 |
| 0.5030 | 673.0 | 15.7183 | 100.20 | 102.476 | -2.27 |
| 0.5050 | 673.0 | 11.3662 | 65.70 | 66.439 | -1.12 |
| 0.5070 | 673.0 | 7.2046 | 39.85 | 39.759 | 0.23 |
| 0.6530 | 673.0 | 24.8324 | 286.10 | 288.165 | -0.72 |
| 0.6530 | 673.0 | 23.4467 | 251.50 | 251.337 | 0.06 |
| 0.6530 | 673.0 | 21.3767 | 207.10 | 206.205 | 0.43 |
| 0.6530 | 673.0 | 19.9760 | 181.60 | 180.436 | 0.64 |
| 0.6540 | 673.0 | 17.8827 | 148.80 | 147.617 | 0.79 |
| 0.6540 | 673.0 | 15.6152 | 118.90 | 117.881 | 0.86 |
| 0.6560 | 673.0 | 12.0802 | 82.30 | 81.063 | 1.50 |
| 0.6580 | 673.0 | 8.7291 | 54.40 | 53.812 | 1.08 |
| 0.6420 | 673.0 | 5.5130 | 32.40 | 31.935 | 1.44 |
| 0.8660 | 673.0 | 5.5402 | 35.10 | 33.945 | 3.29 |
| 0.8590 | 673.0 | 9.4697 | 67.60 | 63.725 | 5.73 |
| 0.8560 | 673.0 | 11.9603 | 93.50 | 86.877 | 7.08 |
| 0.8560 | 673.0 | 13.6799 | 114.80 | 105.675 | 7.95 |
| 0.8555 | 673.0 | 16.1603 | 151.30 | 138.420 | 8.51 |
| 0.8550 | 673.0 | 18.5357 | 195.70 | 180.265 | 7.89 |
| 0.8545 | 673.0 | 19.5848 | 217.70 | 205.716 | 5.50 |
| 0.8540 | 673.0 | 20.3707 | 236.70 | 232.371 | 1.83 |

Table 3
Solubility of N₂ in H₂O, by Alvarez et al. [12]
Saturated liquid composition at T, p: x_{meas}, is compared with model prediction: x_{calc}
Model prediction for coexisting vapor composition y_{calc} is also given

| T K | p MPa | x _{meas} Ref. 12 | x _{calc} present | y _{calc} present | k _H GPa present | k _H GPa Ref.12 |
|--------|----------|------------------------------|------------------------------|------------------------------|----------------------------------|---------------------------------|
| 636.50 | 25.60 | 0.01076 | 0.011105 | 0.12247 | 0.499 | 0.356 |
| 630.50 | 22.87 | 0.00745 | 0.007678 | 0.11055 | 0.593 | 0.479 |
| 628.00 | 25.02 | 0.01092 | 0.010555 | 0.17317 | 0.632 | 0.465 |
| 620.10 | 20.72 | 0.00621 | 0.006070 | 0.13697 | 0.756 | 0.632 |
| 613.20 | 19.47 | 0.005597 | 0.005346 | 0.15713 | 0.868 | 0.731 |
| 606.30 | 18.60 | 0.005338 | 0.005008 | 0.18717 | 0.985 | 0.830 |
| 589.30 | 18.68 | 0.005469 | 0.005506 | 0.32452 | 1.308 | 1.205 |
| 582.10 | 17.03 | 0.004403 | 0.004568 | 0.33574 | 1.461 | 1.415 |
| 572.60 | 13.71 | 0.002772 | 0.002908 | 0.30233 | 1.682 | 1.680 |
| 565.50 | 11.92 | 0.002125 | 0.002170 | 0.28769 | 1.862 | 1.802 |
| 544.90 | 8.616 | 0.001200 | 0.001169 | 0.29444 | 2.468 | 2.33 |
| 521.90 | 5.168 | 0.000385 | 0.000385 | 0.21808 | 3.324 | 3.22 |
| 492.80 | 3.574 | 0.000272 | 0.000264 | 0.33288 | 4.760 | 4.57 |
| 488.80 | 4.020 | 0.000379 | 0.000368 | 0.44508 | 4.996 | 4.83 |
| 475.50 | 2.137 | 0.000082 | 0.000087 | 0.22263 | 5.853 | 6.03 |
| 460.80 | 1.764 | 0.000084 | 0.000082 | 0.31252 | 6.950 | 6.73 |
| 448.30 | 1.327 | 0.000057 | 0.000053 | 0.31588 | 8.021 | 7.44 |
| 432.90 | 1.274 | 0.000078 | 0.000067 | 0.50995 | 9.527 | 8.32 |
| 422.70 | 0.938 | 0.000051 | 0.000042 | 0.49260 | 10.64 | 9.16 |
| 415.40 | 2.298 | 0.000203 | 0.000154 | 0.82481 | 11.49 | 9.21 |
| 415.10 | 0.628 | 0.000026 | 0.000020 | 0.38765 | 11.52 | 9.59 |
| 405.20 | 0.810 | 0.000052 | 0.000038 | 0.64107 | 12.73 | 9.99 |
| 403.40 | 0.534 | 0.000025 | 0.000019 | 0.48688 | 12.96 | 10.52 |
| 396.50 | 1.628 | 0.000130 | 0.000091 | 0.85954 | 13.83 | 10.65 |
| 392.50 | 3.441 | 0.000277 | 0.000198 | 0.93839 | 14.33 | 10.91 |

Table 4

Volume, enthalpy, and fugacity coefficient for each component
for a range of temperatures, on isobars at six mole fractions
of nitrogen in water.

Entries below dashed line are in region where no data exist.

P = 0.05 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 72.94 | 48.66 | 0.9965 | 1.0046 | 440 | 72.97 | 46.65 | 0.9965 | 1.0038 |
| 76.29 | 49.36 | 0.9971 | 1.0036 | 460 | 76.32 | 47.34 | 0.9971 | 1.0030 |
| 79.64 | 50.06 | 0.9975 | 1.0029 | 480 | 79.67 | 48.04 | 0.9976 | 1.0024 |
| 82.99 | 50.76 | 0.9979 | 1.0023 | 500 | 83.01 | 48.73 | 0.9979 | 1.0020 |
| 86.33 | 51.46 | 0.9982 | 1.0019 | 520 | 86.35 | 49.43 | 0.9982 | 1.0016 |
| 89.67 | 52.17 | 0.9984 | 1.0016 | 540 | 89.69 | 50.13 | 0.9984 | 1.0014 |
| 93.01 | 52.88 | 0.9986 | 1.0013 | 560 | 93.02 | 50.84 | 0.9986 | 1.0012 |
| 96.35 | 53.60 | 0.9988 | 1.0011 | 580 | 96.36 | 51.55 | 0.9988 | 1.0010 |
| 99.68 | 54.32 | 0.9989 | 1.0010 | 600 | 99.69 | 52.26 | 0.9990 | 1.0009 |
| 108.02 | 56.14 | 0.9992 | 1.0007 | 650 | 108.02 | 54.06 | 0.9992 | 1.0006 |
| 116.34 | 57.98 | 0.9994 | 1.0005 | 700 | 116.35 | 55.89 | 0.9994 | 1.0005 |
| ----- | | | | | | | | |
| 124.67 | 59.86 | 0.9995 | 1.0004 | 750 | 124.67 | 57.75 | 0.9995 | 1.0004 |
| 132.99 | 61.76 | 0.9996 | 1.0003 | 800 | 133.00 | 59.63 | 0.9996 | 1.0003 |
| 149.63 | 65.66 | 0.9998 | 1.0002 | 900 | 149.64 | 63.49 | 0.9998 | 1.0002 |
| 166.27 | 69.68 | 0.9998 | 1.0002 | 1000 | 166.27 | 67.48 | 0.9998 | 1.0002 |

| x = 0.20 | | | | | x = 0.40 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 73.02 | 42.64 | 0.9967 | 1.0025 | 440 | 73.08 | 34.60 | 0.9973 | 1.0011 |
| 76.36 | 43.31 | 0.9973 | 1.0021 | 460 | 76.42 | 35.25 | 0.9977 | 1.0009 |
| 79.70 | 43.99 | 0.9977 | 1.0017 | 480 | 79.75 | 35.91 | 0.9981 | 1.0008 |
| 83.04 | 44.68 | 0.9980 | 1.0014 | 500 | 83.09 | 36.57 | 0.9983 | 1.0007 |
| 86.38 | 45.36 | 0.9983 | 1.0012 | 520 | 86.42 | 37.23 | 0.9985 | 1.0006 |
| 89.71 | 46.05 | 0.9985 | 1.0010 | 540 | 89.75 | 37.89 | 0.9987 | 1.0005 |
| 93.04 | 46.75 | 0.9987 | 1.0009 | 560 | 93.08 | 38.56 | 0.9989 | 1.0005 |
| 96.38 | 47.44 | 0.9989 | 1.0008 | 580 | 96.41 | 39.23 | 0.9990 | 1.0004 |
| 99.71 | 48.14 | 0.9990 | 1.0007 | 600 | 99.74 | 39.91 | 0.9991 | 1.0004 |
| 108.04 | 49.91 | 0.9992 | 1.0005 | 650 | 108.06 | 41.62 | 0.9993 | 1.0003 |
| 116.36 | 51.71 | 0.9994 | 1.0004 | 700 | 116.38 | 43.35 | 0.9995 | 1.0003 |
| ----- | | | | | | | | |
| 124.68 | 53.53 | 0.9995 | 1.0003 | 750 | 124.70 | 45.10 | 0.9996 | 1.0002 |
| 133.00 | 55.38 | 0.9996 | 1.0003 | 800 | 133.02 | 46.88 | 0.9997 | 1.0002 |
| 149.64 | 59.17 | 0.9998 | 1.0002 | 900 | 149.66 | 50.51 | 0.9998 | 1.0002 |
| 166.28 | 63.07 | 0.9998 | 1.0002 | 1000 | 166.29 | 54.24 | 0.9999 | 1.0001 |

| x = 0.60 | | | | | x = 0.80 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 73.13 | 26.55 | 0.9980 | 1.0004 | 440 | 73.16 | 18.50 | 0.9986 | 1.0001 |
| 76.46 | 27.18 | 0.9983 | 1.0004 | 460 | 76.49 | 19.11 | 0.9988 | 1.0001 |
| 79.79 | 27.81 | 0.9985 | 1.0003 | 480 | 79.81 | 19.72 | 0.9990 | 1.0001 |
| 83.12 | 28.45 | 0.9987 | 1.0003 | 500 | 83.14 | 20.33 | 0.9991 | 1.0001 |
| 86.45 | 29.09 | 0.9989 | 1.0003 | 520 | 86.47 | 20.95 | 0.9992 | 1.0001 |
| 89.78 | 29.73 | 0.9990 | 1.0003 | 540 | 89.80 | 21.57 | 0.9993 | 1.0001 |
| 93.11 | 30.38 | 0.9991 | 1.0003 | 560 | 93.12 | 22.19 | 0.9994 | 1.0001 |
| 96.43 | 31.02 | 0.9992 | 1.0002 | 580 | 96.45 | 22.81 | 0.9995 | 1.0001 |
| 99.76 | 31.68 | 0.9993 | 1.0002 | 600 | 99.78 | 23.44 | 0.9995 | 1.0001 |
| 108.08 | 33.32 | 0.9995 | 1.0002 | 650 | 108.09 | 25.02 | 0.9997 | 1.0001 |
| 116.40 | 34.98 | 0.9996 | 1.0002 | 700 | 116.41 | 26.61 | 0.9997 | 1.0001 |
| ----- | | | | | | | | |
| 124.72 | 36.66 | 0.9997 | 1.0002 | 750 | 124.73 | 28.23 | 0.9998 | 1.0001 |
| 133.03 | 38.37 | 0.9997 | 1.0002 | 800 | 133.04 | 29.86 | 0.9999 | 1.0001 |
| 149.67 | 41.85 | 0.9998 | 1.0001 | 900 | 149.67 | 33.19 | 0.9999 | 1.0001 |
| 166.30 | 45.42 | 0.9999 | 1.0001 | 1000 | 166.30 | 36.60 | 1.0000 | 1.0001 |

P = 0.1 MPa

| x = 0.05 | | | | | x = 0.10 | | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|--|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| 36.36 | 48.61 | 0.9930 | 1.0093 | 440 | 36.38 | 46.61 | 0.9931 | 1.0077 | |
| 38.05 | 49.32 | 0.9941 | 1.0073 | 460 | 38.07 | 47.31 | 0.9942 | 1.0061 | |
| 39.73 | 50.02 | 0.9951 | 1.0058 | 480 | 39.76 | 48.01 | 0.9952 | 1.0049 | |
| 41.42 | 50.73 | 0.9958 | 1.0047 | 500 | 41.44 | 48.70 | 0.9959 | 1.0040 | |
| 43.10 | 51.43 | 0.9964 | 1.0038 | 520 | 43.11 | 49.41 | 0.9965 | 1.0033 | |
| 44.77 | 52.15 | 0.9969 | 1.0032 | 540 | 44.79 | 50.11 | 0.9969 | 1.0028 | |
| 46.45 | 52.86 | 0.9973 | 1.0027 | 560 | 46.46 | 50.82 | 0.9973 | 1.0024 | |
| 48.12 | 53.58 | 0.9977 | 1.0023 | 580 | 48.13 | 51.53 | 0.9977 | 1.0020 | |
| 49.80 | 54.30 | 0.9979 | 1.0020 | 600 | 49.81 | 52.24 | 0.9980 | 1.0018 | |
| 53.97 | 56.12 | 0.9985 | 1.0014 | 650 | 53.98 | 54.05 | 0.9985 | 1.0013 | |
| 58.14 | 57.97 | 0.9988 | 1.0011 | 700 | 58.15 | 55.88 | 0.9988 | 1.0010 | |
| ----- | | | | | ----- | | | | |
| 62.31 | 59.85 | 0.9991 | 1.0008 | 750 | 62.32 | 57.74 | 0.9991 | 1.0008 | |
| 66.48 | 61.75 | 0.9993 | 1.0007 | 800 | 66.48 | 59.63 | 0.9993 | 1.0007 | |
| 74.80 | 65.65 | 0.9995 | 1.0005 | 900 | 74.81 | 63.49 | 0.9995 | 1.0005 | |
| 83.13 | 69.68 | 0.9997 | 1.0004 | 1000 | 83.13 | 67.47 | 0.9997 | 1.0004 | |
| ----- | | | | | ----- | | | | |
| x = 0.20 | | | | | x = 0.40 | | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| 36.43 | 42.61 | 0.9935 | 1.0051 | 440 | 36.50 | 34.58 | 0.9947 | 1.0022 | |
| 38.11 | 43.29 | 0.9946 | 1.0042 | 460 | 38.17 | 35.24 | 0.9955 | 1.0019 | |
| 39.79 | 43.97 | 0.9954 | 1.0034 | 480 | 39.84 | 35.89 | 0.9962 | 1.0016 | |
| 41.47 | 44.66 | 0.9961 | 1.0029 | 500 | 41.51 | 36.55 | 0.9967 | 1.0014 | |
| 43.14 | 45.34 | 0.9966 | 1.0024 | 520 | 43.18 | 37.22 | 0.9971 | 1.0012 | |
| 44.81 | 46.04 | 0.9971 | 1.0021 | 540 | 44.85 | 37.88 | 0.9975 | 1.0011 | |
| 46.48 | 46.73 | 0.9974 | 1.0018 | 560 | 46.52 | 38.55 | 0.9978 | 1.0010 | |
| 48.15 | 47.43 | 0.9978 | 1.0016 | 580 | 48.19 | 39.23 | 0.9980 | 1.0009 | |
| 49.82 | 48.13 | 0.9980 | 1.0014 | 600 | 49.85 | 39.90 | 0.9983 | 1.0008 | |
| 53.99 | 49.90 | 0.9985 | 1.0011 | 650 | 54.02 | 41.61 | 0.9987 | 1.0007 | |
| 58.16 | 51.70 | 0.9989 | 1.0009 | 700 | 58.18 | 43.34 | 0.9990 | 1.0006 | |
| ----- | | | | | ----- | | | | |
| 62.33 | 53.52 | 0.9991 | 1.0007 | 750 | 62.34 | 45.09 | 0.9992 | 1.0005 | |
| 66.49 | 55.38 | 0.9993 | 1.0006 | 800 | 66.51 | 46.87 | 0.9994 | 1.0005 | |
| 74.81 | 59.16 | 0.9996 | 1.0005 | 900 | 74.83 | 50.51 | 0.9996 | 1.0004 | |
| 83.13 | 63.06 | 0.9997 | 1.0004 | 1000 | 83.14 | 54.24 | 0.9997 | 1.0003 | |
| ----- | | | | | ----- | | | | |
| x = 0.60 | | | | | x = 0.80 | | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| 36.55 | 26.54 | 0.9960 | 1.0008 | 440 | 36.57 | 18.49 | 0.9973 | 1.0003 | |
| 38.21 | 27.17 | 0.9966 | 1.0008 | 460 | 38.24 | 19.10 | 0.9977 | 1.0003 | |
| 39.88 | 27.81 | 0.9971 | 1.0007 | 480 | 39.90 | 19.72 | 0.9980 | 1.0003 | |
| 41.55 | 28.44 | 0.9974 | 1.0007 | 500 | 41.57 | 20.33 | 0.9982 | 1.0003 | |
| 43.21 | 29.08 | 0.9978 | 1.0006 | 520 | 43.23 | 20.95 | 0.9985 | 1.0003 | |
| 44.88 | 29.73 | 0.9980 | 1.0006 | 540 | 44.90 | 21.57 | 0.9987 | 1.0003 | |
| 46.54 | 30.37 | 0.9983 | 1.0005 | 560 | 46.56 | 22.19 | 0.9988 | 1.0003 | |
| 48.21 | 31.02 | 0.9985 | 1.0005 | 580 | 48.23 | 22.81 | 0.9990 | 1.0003 | |
| 49.88 | 31.67 | 0.9986 | 1.0005 | 600 | 49.89 | 23.44 | 0.9991 | 1.0003 | |
| 54.04 | 33.31 | 0.9990 | 1.0004 | 650 | 54.05 | 25.02 | 0.9993 | 1.0003 | |
| 58.20 | 34.98 | 0.9992 | 1.0004 | 700 | 58.21 | 26.61 | 0.9995 | 1.0003 | |
| ----- | | | | | ----- | | | | |
| 62.36 | 36.66 | 0.9994 | 1.0004 | 750 | 62.37 | 28.23 | 0.9996 | 1.0003 | |
| 66.52 | 38.37 | 0.9995 | 1.0003 | 800 | 66.53 | 29.86 | 0.9998 | 1.0003 | |
| 74.84 | 41.85 | 0.9997 | 1.0003 | 900 | 74.84 | 33.19 | 0.9999 | 1.0002 | |
| 83.15 | 45.42 | 0.9998 | 1.0003 | 1000 | 83.16 | 36.60 | 1.0000 | 1.0002 | |

P = 0.15 MPa

| x = 0.05 | | | | | x = 0.10 | | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|--|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| 24.16 | 48.57 | 0.9894 | 1.0142 | 440 | 24.19 | 46.57 | 0.9896 | 1.0116 | |
| 25.30 | 49.28 | 0.9912 | 1.0111 | 460 | 25.32 | 47.27 | 0.9914 | 1.0092 | |
| 26.43 | 49.99 | 0.9926 | 1.0088 | 480 | 26.45 | 47.97 | 0.9927 | 1.0074 | |
| 27.56 | 50.70 | 0.9937 | 1.0071 | 500 | 27.58 | 48.68 | 0.9938 | 1.0061 | |
| 28.69 | 51.41 | 0.9947 | 1.0058 | 520 | 28.70 | 49.38 | 0.9947 | 1.0050 | |
| 29.81 | 52.12 | 0.9954 | 1.0048 | 540 | 29.82 | 50.09 | 0.9954 | 1.0042 | |
| 30.93 | 52.84 | 0.9960 | 1.0041 | 560 | 30.94 | 50.80 | 0.9960 | 1.0036 | |
| 32.05 | 53.56 | 0.9965 | 1.0035 | 580 | 32.06 | 51.51 | 0.9965 | 1.0031 | |
| 33.17 | 54.28 | 0.9969 | 1.0030 | 600 | 33.18 | 52.23 | 0.9970 | 1.0027 | |
| 35.96 | 56.11 | 0.9977 | 1.0021 | 650 | 35.96 | 54.04 | 0.9977 | 1.0020 | |
| 38.74 | 57.96 | 0.9983 | 1.0016 | 700 | 38.75 | 55.87 | 0.9983 | 1.0015 | |
| <hr/> | | | | | | | | | |
| 41.52 | 59.84 | 0.9987 | 1.0013 | 750 | 41.53 | 57.73 | 0.9987 | 1.0012 | |
| 44.30 | 61.74 | 0.9990 | 1.0010 | 800 | 44.31 | 59.62 | 0.9990 | 1.0010 | |
| 49.86 | 65.65 | 0.9993 | 1.0008 | 900 | 49.86 | 63.48 | 0.9993 | 1.0008 | |
| 55.41 | 69.67 | 0.9996 | 1.0006 | 1000 | 55.41 | 67.47 | 0.9996 | 1.0006 | |
| <hr/> | | | | | | | | | |
| x = 0.20 | | | | | x = 0.40 | | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| 24.24 | 42.58 | 0.9903 | 1.0078 | 440 | 24.31 | 34.56 | 0.9921 | 1.0033 | |
| 25.36 | 43.26 | 0.9919 | 1.0063 | 460 | 25.42 | 35.22 | 0.9933 | 1.0028 | |
| 26.49 | 43.95 | 0.9931 | 1.0052 | 480 | 26.54 | 35.88 | 0.9943 | 1.0024 | |
| 27.61 | 44.64 | 0.9941 | 1.0044 | 500 | 27.66 | 36.54 | 0.9951 | 1.0021 | |
| 28.73 | 45.33 | 0.9950 | 1.0037 | 520 | 28.77 | 37.21 | 0.9957 | 1.0019 | |
| 29.85 | 46.02 | 0.9956 | 1.0032 | 540 | 29.89 | 37.87 | 0.9962 | 1.0017 | |
| 30.96 | 46.72 | 0.9962 | 1.0028 | 560 | 31.00 | 38.55 | 0.9967 | 1.0015 | |
| 32.08 | 47.42 | 0.9967 | 1.0024 | 580 | 32.11 | 39.22 | 0.9971 | 1.0014 | |
| 33.19 | 48.12 | 0.9971 | 1.0021 | 600 | 33.22 | 39.90 | 0.9974 | 1.0013 | |
| 35.98 | 49.89 | 0.9978 | 1.0016 | 650 | 36.00 | 41.60 | 0.9981 | 1.0011 | |
| 38.76 | 51.69 | 0.9983 | 1.0013 | 700 | 38.78 | 43.34 | 0.9985 | 1.0009 | |
| <hr/> | | | | | | | | | |
| 41.54 | 53.52 | 0.9987 | 1.0011 | 750 | 41.56 | 45.09 | 0.9988 | 1.0008 | |
| 44.32 | 55.37 | 0.9990 | 1.0009 | 800 | 44.33 | 46.87 | 0.9991 | 1.0007 | |
| 49.87 | 59.16 | 0.9994 | 1.0007 | 900 | 49.88 | 50.50 | 0.9994 | 1.0006 | |
| 55.42 | 63.06 | 0.9996 | 1.0006 | 1000 | 55.43 | 54.24 | 0.9996 | 1.0005 | |
| <hr/> | | | | | | | | | |
| x = 0.60 | | | | | x = 0.80 | | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| 24.35 | 26.53 | 0.9941 | 1.0013 | 440 | 24.38 | 18.49 | 0.9960 | 1.0005 | |
| 25.46 | 27.17 | 0.9949 | 1.0012 | 460 | 25.49 | 19.10 | 0.9965 | 1.0005 | |
| 26.58 | 27.80 | 0.9956 | 1.0011 | 480 | 26.60 | 19.71 | 0.9970 | 1.0005 | |
| 27.69 | 28.44 | 0.9962 | 1.0010 | 500 | 27.71 | 20.33 | 0.9974 | 1.0005 | |
| 28.80 | 29.08 | 0.9967 | 1.0009 | 520 | 28.82 | 20.94 | 0.9977 | 1.0005 | |
| 29.91 | 29.72 | 0.9971 | 1.0009 | 540 | 29.93 | 21.56 | 0.9980 | 1.0005 | |
| 31.02 | 30.37 | 0.9974 | 1.0008 | 560 | 31.04 | 22.19 | 0.9982 | 1.0005 | |
| 32.14 | 31.02 | 0.9977 | 1.0008 | 580 | 32.15 | 22.81 | 0.9985 | 1.0005 | |
| 33.25 | 31.67 | 0.9980 | 1.0008 | 600 | 33.26 | 23.44 | 0.9986 | 1.0005 | |
| 36.02 | 33.31 | 0.9985 | 1.0007 | 650 | 36.04 | 25.02 | 0.9990 | 1.0004 | |
| 38.80 | 34.98 | 0.9988 | 1.0006 | 700 | 38.81 | 26.61 | 0.9993 | 1.0004 | |
| <hr/> | | | | | | | | | |
| 41.57 | 36.66 | 0.9991 | 1.0006 | 750 | 41.58 | 28.23 | 0.9995 | 1.0004 | |
| 44.35 | 38.37 | 0.9993 | 1.0005 | 800 | 44.36 | 29.86 | 0.9996 | 1.0004 | |
| 49.89 | 41.85 | 0.9996 | 1.0005 | 900 | 49.90 | 33.19 | 0.9999 | 1.0003 | |
| 55.44 | 45.42 | 0.9997 | 1.0004 | 1000 | 55.44 | 36.60 | 1.0000 | 1.0003 | |

P = 0.2 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 18.06 | 48.52 | 0.9859 | 1.0192 | 440 | 18.09 | 46.53 | 0.9862 | 1.0157 |
| 18.92 | 49.23 | 0.9883 | 1.0149 | 460 | 18.95 | 47.24 | 0.9885 | 1.0124 |
| 19.78 | 49.95 | 0.9902 | 1.0118 | 480 | 19.80 | 47.94 | 0.9903 | 1.0100 |
| 20.63 | 50.66 | 0.9917 | 1.0096 | 500 | 20.65 | 48.65 | 0.9918 | 1.0081 |
| 21.48 | 51.38 | 0.9929 | 1.0078 | 520 | 21.50 | 49.36 | 0.9930 | 1.0068 |
| 22.33 | 52.10 | 0.9939 | 1.0065 | 540 | 22.34 | 50.07 | 0.9939 | 1.0057 |
| 23.17 | 52.82 | 0.9947 | 1.0055 | 560 | 23.18 | 50.78 | 0.9947 | 1.0048 |
| 24.01 | 53.54 | 0.9953 | 1.0047 | 580 | 24.02 | 51.49 | 0.9954 | 1.0042 |
| 24.85 | 54.26 | 0.9959 | 1.0040 | 600 | 24.86 | 52.21 | 0.9959 | 1.0036 |
| 26.95 | 56.09 | 0.9970 | 1.0029 | 650 | 26.96 | 54.02 | 0.9970 | 1.0026 |
| 29.04 | 57.95 | 0.9977 | 1.0022 | 700 | 29.05 | 55.86 | 0.9977 | 1.0020 |
| <hr/> | | | | | | | | |
| 31.13 | 59.83 | 0.9982 | 1.0017 | 750 | 31.14 | 57.72 | 0.9983 | 1.0016 |
| 33.22 | 61.74 | 0.9986 | 1.0014 | 800 | 33.22 | 59.61 | 0.9986 | 1.0014 |
| 37.39 | 65.64 | 0.9991 | 1.0010 | 900 | 37.39 | 63.48 | 0.9991 | 1.0010 |
| 41.55 | 69.67 | 0.9994 | 1.0008 | 1000 | 41.56 | 67.46 | 0.9994 | 1.0008 |
| <hr/> | | | | | | | | |
| x = 0.20 | | | | | x = 0.40 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 18.14 | 42.55 | 0.9871 | 1.0104 | 440 | 18.21 | 34.55 | 0.9895 | 1.0044 |
| 18.99 | 43.24 | 0.9892 | 1.0085 | 460 | 19.05 | 35.21 | 0.9911 | 1.0038 |
| 19.84 | 43.93 | 0.9909 | 1.0070 | 480 | 19.89 | 35.87 | 0.9924 | 1.0033 |
| 20.68 | 44.62 | 0.9922 | 1.0058 | 500 | 20.73 | 36.53 | 0.9934 | 1.0029 |
| 21.52 | 45.31 | 0.9933 | 1.0050 | 520 | 21.57 | 37.20 | 0.9943 | 1.0025 |
| 22.36 | 46.00 | 0.9942 | 1.0043 | 540 | 22.40 | 37.87 | 0.9950 | 1.0023 |
| 23.20 | 46.70 | 0.9949 | 1.0037 | 560 | 23.24 | 38.54 | 0.9956 | 1.0021 |
| 24.04 | 47.40 | 0.9956 | 1.0032 | 580 | 24.07 | 39.21 | 0.9961 | 1.0019 |
| 24.88 | 48.11 | 0.9961 | 1.0029 | 600 | 24.91 | 39.89 | 0.9966 | 1.0017 |
| 26.97 | 49.88 | 0.9971 | 1.0022 | 650 | 27.00 | 41.60 | 0.9974 | 1.0014 |
| 29.06 | 51.68 | 0.9978 | 1.0018 | 700 | 29.08 | 43.33 | 0.9980 | 1.0012 |
| <hr/> | | | | | | | | |
| 31.15 | 53.51 | 0.9983 | 1.0015 | 750 | 31.16 | 45.09 | 0.9985 | 1.0011 |
| 33.23 | 55.36 | 0.9987 | 1.0013 | 800 | 33.25 | 46.87 | 0.9988 | 1.0010 |
| 37.40 | 59.15 | 0.9991 | 1.0010 | 900 | 37.41 | 50.50 | 0.9992 | 1.0008 |
| 41.56 | 63.06 | 0.9994 | 1.0008 | 1000 | 41.57 | 54.24 | 0.9995 | 1.0007 |
| <hr/> | | | | | | | | |
| x = 0.60 | | | | | x = 0.80 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 18.25 | 26.52 | 0.9921 | 1.0017 | 440 | 18.28 | 18.49 | 0.9946 | 1.0006 |
| 19.09 | 27.16 | 0.9932 | 1.0016 | 460 | 19.12 | 19.10 | 0.9954 | 1.0006 |
| 19.93 | 27.79 | 0.9942 | 1.0015 | 480 | 19.95 | 19.71 | 0.9960 | 1.0007 |
| 20.76 | 28.43 | 0.9949 | 1.0013 | 500 | 20.78 | 20.33 | 0.9965 | 1.0007 |
| 21.60 | 29.07 | 0.9955 | 1.0013 | 520 | 21.62 | 20.94 | 0.9970 | 1.0007 |
| 22.43 | 29.72 | 0.9961 | 1.0012 | 540 | 22.45 | 21.56 | 0.9973 | 1.0007 |
| 23.26 | 30.36 | 0.9965 | 1.0011 | 560 | 23.28 | 22.18 | 0.9977 | 1.0006 |
| 24.10 | 31.01 | 0.9969 | 1.0011 | 580 | 24.11 | 22.81 | 0.9980 | 1.0006 |
| 24.93 | 31.66 | 0.9973 | 1.0010 | 600 | 24.95 | 23.44 | 0.9982 | 1.0006 |
| 27.02 | 33.31 | 0.9979 | 1.0009 | 650 | 27.03 | 25.02 | 0.9987 | 1.0006 |
| 29.10 | 34.97 | 0.9984 | 1.0008 | 700 | 29.11 | 26.61 | 0.9991 | 1.0006 |
| <hr/> | | | | | | | | |
| 31.18 | 36.66 | 0.9988 | 1.0008 | 750 | 31.19 | 28.23 | 0.9993 | 1.0006 |
| 33.26 | 38.37 | 0.9991 | 1.0007 | 800 | 33.27 | 29.86 | 0.9995 | 1.0005 |
| 37.42 | 41.85 | 0.9994 | 1.0006 | 900 | 37.43 | 33.19 | 0.9998 | 1.0005 |
| 41.58 | 45.42 | 0.9997 | 1.0005 | 1000 | 41.59 | 36.60 | 1.0000 | 1.0004 |

P = 0.3 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 11.96 | 48.42 | 0.9788 | 1.0297 | 440 | 11.99 | 46.45 | 0.9793 | 1.0241 |
| 12.55 | 49.15 | 0.9825 | 1.0229 | 460 | 12.57 | 47.17 | 0.9828 | 1.0189 |
| 13.13 | 49.88 | 0.9853 | 1.0181 | 480 | 13.15 | 47.88 | 0.9855 | 1.0152 |
| 13.70 | 50.60 | 0.9875 | 1.0146 | 500 | 13.72 | 48.60 | 0.9877 | 1.0124 |
| 14.27 | 51.33 | 0.9893 | 1.0119 | 520 | 14.29 | 49.31 | 0.9895 | 1.0102 |
| 14.84 | 52.05 | 0.9908 | 1.0099 | 540 | 14.86 | 50.02 | 0.9909 | 1.0086 |
| 15.41 | 52.77 | 0.9920 | 1.0083 | 560 | 15.42 | 50.74 | 0.9921 | 1.0073 |
| 15.97 | 53.50 | 0.9930 | 1.0071 | 580 | 15.99 | 51.46 | 0.9931 | 1.0063 |
| 16.54 | 54.23 | 0.9939 | 1.0061 | 600 | 16.55 | 52.18 | 0.9939 | 1.0055 |
| 17.94 | 56.07 | 0.9955 | 1.0043 | 650 | 17.95 | 54.00 | 0.9955 | 1.0040 |
| 19.34 | 57.92 | 0.9966 | 1.0033 | 700 | 19.35 | 55.84 | 0.9966 | 1.0031 |
| ----- | | | | | | | | |
| 20.74 | 59.81 | 0.9974 | 1.0026 | 750 | 20.74 | 57.71 | 0.9974 | 1.0025 |
| 22.13 | 61.72 | 0.9980 | 1.0021 | 800 | 22.14 | 59.60 | 0.9980 | 1.0021 |
| 24.92 | 65.63 | 0.9987 | 1.0016 | 900 | 24.92 | 63.47 | 0.9987 | 1.0016 |
| 27.70 | 69.66 | 0.9992 | 1.0013 | 1000 | 27.70 | 67.46 | 0.9992 | 1.0013 |
| ----- | | | | | | | | |
| x = 0.20 | | | | | x = 0.40 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 12.04 | 42.49 | 0.9806 | 1.0159 | 440 | 12.11 | 34.52 | 0.9843 | 1.0067 |
| 12.61 | 43.18 | 0.9838 | 1.0129 | 460 | 12.68 | 35.18 | 0.9867 | 1.0057 |
| 13.18 | 43.88 | 0.9863 | 1.0106 | 480 | 13.24 | 35.84 | 0.9886 | 1.0050 |
| 13.75 | 44.58 | 0.9883 | 1.0088 | 500 | 13.80 | 36.51 | 0.9902 | 1.0043 |
| 14.32 | 45.27 | 0.9899 | 1.0075 | 520 | 14.36 | 37.18 | 0.9915 | 1.0038 |
| 14.88 | 45.97 | 0.9913 | 1.0064 | 540 | 14.92 | 37.85 | 0.9925 | 1.0034 |
| 15.44 | 46.67 | 0.9924 | 1.0056 | 560 | 15.48 | 38.52 | 0.9934 | 1.0031 |
| 16.01 | 47.38 | 0.9934 | 1.0049 | 580 | 16.04 | 39.20 | 0.9942 | 1.0028 |
| 16.57 | 48.08 | 0.9941 | 1.0043 | 600 | 16.60 | 39.88 | 0.9949 | 1.0026 |
| 17.96 | 49.86 | 0.9957 | 1.0033 | 650 | 17.99 | 41.59 | 0.9962 | 1.0022 |
| 19.36 | 51.67 | 0.9967 | 1.0027 | 700 | 19.38 | 43.32 | 0.9971 | 1.0019 |
| ----- | | | | | | | | |
| 20.75 | 53.50 | 0.9975 | 1.0022 | 750 | 20.77 | 45.08 | 0.9977 | 1.0017 |
| 22.15 | 55.35 | 0.9980 | 1.0019 | 800 | 22.16 | 46.86 | 0.9982 | 1.0015 |
| 24.93 | 59.14 | 0.9987 | 1.0015 | 900 | 24.94 | 50.49 | 0.9989 | 1.0012 |
| 27.70 | 63.05 | 0.9992 | 1.0012 | 1000 | 27.72 | 54.23 | 0.9993 | 1.0011 |
| ----- | | | | | | | | |
| x = 0.60 | | | | | x = 0.80 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 12.16 | 26.51 | 0.9882 | 1.0026 | 440 | 12.18 | 18.48 | 0.9919 | 1.0010 |
| 12.72 | 27.14 | 0.9899 | 1.0024 | 460 | 12.74 | 19.09 | 0.9931 | 1.0010 |
| 13.27 | 27.78 | 0.9913 | 1.0022 | 480 | 13.30 | 19.70 | 0.9940 | 1.0010 |
| 13.83 | 28.42 | 0.9924 | 1.0020 | 500 | 13.85 | 20.32 | 0.9948 | 1.0010 |
| 14.39 | 29.06 | 0.9933 | 1.0019 | 520 | 14.41 | 20.94 | 0.9955 | 1.0010 |
| 14.95 | 29.71 | 0.9942 | 1.0018 | 540 | 14.97 | 21.56 | 0.9960 | 1.0010 |
| 15.50 | 30.35 | 0.9948 | 1.0017 | 560 | 15.52 | 22.18 | 0.9965 | 1.0010 |
| 16.06 | 31.00 | 0.9954 | 1.0016 | 580 | 16.08 | 22.81 | 0.9970 | 1.0010 |
| 16.62 | 31.66 | 0.9959 | 1.0015 | 600 | 16.63 | 23.43 | 0.9973 | 1.0010 |
| 18.01 | 33.30 | 0.9969 | 1.0014 | 650 | 18.02 | 25.01 | 0.9981 | 1.0009 |
| 19.40 | 34.97 | 0.9977 | 1.0013 | 700 | 19.41 | 26.61 | 0.9986 | 1.0009 |
| ----- | | | | | | | | |
| 20.79 | 36.65 | 0.9982 | 1.0012 | 750 | 20.80 | 28.23 | 0.9990 | 1.0008 |
| 22.17 | 38.36 | 0.9986 | 1.0011 | 800 | 22.18 | 29.86 | 0.9993 | 1.0008 |
| 24.95 | 41.84 | 0.9992 | 1.0009 | 900 | 24.96 | 33.19 | 0.9997 | 1.0007 |
| 27.72 | 45.42 | 0.9995 | 1.0008 | 1000 | 27.73 | 36.60 | 1.0000 | 1.0006 |

P = 0.4 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 8.91 | 48.32 | 0.9717 | 1.0407 | 440 | 8.94 | 46.36 | 0.9723 | 1.0328 |
| 9.36 | 49.07 | 0.9766 | 1.0313 | 460 | 9.38 | 47.09 | 0.9770 | 1.0257 |
| 9.80 | 49.80 | 0.9804 | 1.0246 | 480 | 9.82 | 47.82 | 0.9807 | 1.0205 |
| 10.24 | 50.54 | 0.9834 | 1.0197 | 500 | 10.25 | 48.54 | 0.9836 | 1.0167 |
| 10.67 | 51.27 | 0.9858 | 1.0161 | 520 | 10.69 | 49.26 | 0.9860 | 1.0138 |
| 11.10 | 52.00 | 0.9878 | 1.0133 | 540 | 11.11 | 49.98 | 0.9879 | 1.0116 |
| 11.53 | 52.73 | 0.9894 | 1.0112 | 560 | 11.54 | 50.70 | 0.9895 | 1.0098 |
| 11.96 | 53.46 | 0.9907 | 1.0095 | 580 | 11.97 | 51.43 | 0.9908 | 1.0084 |
| 12.38 | 54.19 | 0.9919 | 1.0082 | 600 | 12.39 | 52.15 | 0.9919 | 1.0073 |
| 13.44 | 56.04 | 0.9940 | 1.0058 | 650 | 13.45 | 53.97 | 0.9941 | 1.0054 |
| 14.49 | 57.90 | 0.9955 | 1.0044 | 700 | 14.50 | 55.82 | 0.9955 | 1.0041 |
| ----- | | | | | | | | |
| 15.54 | 59.79 | 0.9965 | 1.0035 | 750 | 15.55 | 57.69 | 0.9966 | 1.0033 |
| 16.59 | 61.70 | 0.9973 | 1.0029 | 800 | 16.59 | 59.58 | 0.9973 | 1.0028 |
| 18.68 | 65.62 | 0.9983 | 1.0021 | 900 | 18.68 | 63.46 | 0.9983 | 1.0021 |
| 20.77 | 69.65 | 0.9989 | 1.0017 | 1000 | 20.77 | 67.45 | 0.9989 | 1.0017 |
| ----- | | | | | | | | |
| x = 0.20 | | | | | x = 0.40 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 8.99 | 42.43 | 0.9742 | 1.0215 | 440 | 9.06 | 34.49 | 0.9791 | 1.0090 |
| 9.43 | 43.13 | 0.9784 | 1.0173 | 460 | 9.49 | 35.15 | 0.9823 | 1.0077 |
| 9.86 | 43.83 | 0.9817 | 1.0142 | 480 | 9.91 | 35.82 | 0.9848 | 1.0066 |
| 10.29 | 44.54 | 0.9844 | 1.0119 | 500 | 10.34 | 36.49 | 0.9869 | 1.0058 |
| 10.71 | 45.24 | 0.9866 | 1.0101 | 520 | 10.76 | 37.16 | 0.9886 | 1.0052 |
| 11.14 | 45.94 | 0.9884 | 1.0086 | 540 | 11.18 | 37.83 | 0.9901 | 1.0046 |
| 11.56 | 46.64 | 0.9899 | 1.0075 | 560 | 11.60 | 38.50 | 0.9913 | 1.0042 |
| 11.99 | 47.35 | 0.9912 | 1.0066 | 580 | 12.02 | 39.18 | 0.9923 | 1.0038 |
| 12.41 | 48.06 | 0.9922 | 1.0058 | 600 | 12.44 | 39.86 | 0.9932 | 1.0035 |
| 13.46 | 49.84 | 0.9942 | 1.0045 | 650 | 13.49 | 41.58 | 0.9949 | 1.0029 |
| 14.51 | 51.65 | 0.9956 | 1.0036 | 700 | 14.53 | 43.31 | 0.9961 | 1.0025 |
| ----- | | | | | | | | |
| 15.56 | 53.48 | 0.9966 | 1.0030 | 750 | 15.58 | 45.07 | 0.9970 | 1.0022 |
| 16.60 | 55.34 | 0.9974 | 1.0026 | 800 | 16.62 | 46.85 | 0.9976 | 1.0020 |
| 18.69 | 59.14 | 0.9983 | 1.0020 | 900 | 18.70 | 50.49 | 0.9985 | 1.0017 |
| 20.78 | 63.04 | 0.9989 | 1.0017 | 1000 | 20.79 | 54.23 | 0.9991 | 1.0014 |
| ----- | | | | | | | | |
| x = 0.60 | | | | | x = 0.80 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 9.11 | 26.49 | 0.9843 | 1.0035 | 440 | 9.14 | 18.47 | 0.9893 | 1.0013 |
| 9.53 | 27.13 | 0.9865 | 1.0032 | 460 | 9.55 | 19.09 | 0.9908 | 1.0013 |
| 9.95 | 27.77 | 0.9884 | 1.0030 | 480 | 9.97 | 19.70 | 0.9920 | 1.0013 |
| 10.37 | 28.41 | 0.9899 | 1.0028 | 500 | 10.39 | 20.32 | 0.9931 | 1.0013 |
| 10.79 | 29.05 | 0.9911 | 1.0026 | 520 | 10.81 | 20.93 | 0.9940 | 1.0013 |
| 11.21 | 29.70 | 0.9922 | 1.0024 | 540 | 11.23 | 21.55 | 0.9947 | 1.0013 |
| 11.62 | 30.35 | 0.9931 | 1.0023 | 560 | 11.64 | 22.18 | 0.9954 | 1.0013 |
| 12.04 | 31.00 | 0.9939 | 1.0022 | 580 | 12.06 | 22.80 | 0.9959 | 1.0013 |
| 12.46 | 31.65 | 0.9946 | 1.0021 | 600 | 12.48 | 23.43 | 0.9964 | 1.0013 |
| 13.50 | 33.30 | 0.9959 | 1.0019 | 650 | 13.52 | 25.01 | 0.9974 | 1.0012 |
| 14.55 | 34.96 | 0.9969 | 1.0017 | 700 | 14.56 | 26.61 | 0.9981 | 1.0012 |
| ----- | | | | | | | | |
| 15.59 | 36.65 | 0.9976 | 1.0016 | 750 | 15.60 | 28.23 | 0.9987 | 1.0011 |
| 16.63 | 38.36 | 0.9982 | 1.0015 | 800 | 16.64 | 29.86 | 0.9991 | 1.0011 |
| 18.71 | 41.84 | 0.9989 | 1.0013 | 900 | 18.72 | 33.19 | 0.9996 | 1.0010 |
| 20.80 | 45.41 | 0.9994 | 1.0011 | 1000 | 20.80 | 36.60 | 1.0000 | 1.0009 |

P = 0.5 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 7.08 | 48.21 | 0.9645 | 1.0523 | 440 | 7.11 | 46.28 | 0.9653 | 1.0420 |
| 7.44 | 48.98 | 0.9707 | 1.0400 | 460 | 7.47 | 47.02 | 0.9712 | 1.0327 |
| 7.80 | 49.73 | 0.9754 | 1.0313 | 480 | 7.82 | 47.76 | 0.9758 | 1.0260 |
| 8.16 | 50.47 | 0.9792 | 1.0250 | 500 | 8.18 | 48.49 | 0.9795 | 1.0211 |
| 8.51 | 51.21 | 0.9822 | 1.0203 | 520 | 8.52 | 49.21 | 0.9825 | 1.0174 |
| 8.85 | 51.95 | 0.9847 | 1.0168 | 540 | 8.87 | 49.94 | 0.9849 | 1.0146 |
| 9.20 | 52.69 | 0.9867 | 1.0141 | 560 | 9.21 | 50.66 | 0.9869 | 1.0124 |
| 9.54 | 53.42 | 0.9884 | 1.0119 | 580 | 9.55 | 51.39 | 0.9885 | 1.0106 |
| 9.89 | 54.16 | 0.9899 | 1.0103 | 600 | 9.90 | 52.12 | 0.9899 | 1.0092 |
| 10.74 | 56.01 | 0.9925 | 1.0073 | 650 | 10.74 | 53.95 | 0.9926 | 1.0067 |
| 11.58 | 57.88 | 0.9944 | 1.0055 | 700 | 11.59 | 55.80 | 0.9944 | 1.0052 |
| ----- | | | | | | | | |
| 12.42 | 59.77 | 0.9957 | 1.0044 | 750 | 12.43 | 57.67 | 0.9957 | 1.0042 |
| 13.26 | 61.69 | 0.9966 | 1.0036 | 800 | 13.27 | 59.57 | 0.9967 | 1.0035 |
| 14.94 | 65.61 | 0.9979 | 1.0027 | 900 | 14.94 | 63.45 | 0.9979 | 1.0026 |
| 16.61 | 69.64 | 0.9987 | 1.0021 | 1000 | 16.61 | 67.44 | 0.9987 | 1.0022 |
| ----- | | | | | | | | |
| x = 0.20 | | | | | x = 0.40 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 7.16 | 42.37 | 0.9677 | 1.0272 | 440 | 7.23 | 34.46 | 0.9739 | 1.0113 |
| 7.51 | 43.08 | 0.9730 | 1.0219 | 460 | 7.58 | 35.12 | 0.9779 | 1.0097 |
| 7.86 | 43.79 | 0.9772 | 1.0180 | 480 | 7.92 | 35.79 | 0.9810 | 1.0083 |
| 8.21 | 44.49 | 0.9805 | 1.0150 | 500 | 8.26 | 36.46 | 0.9836 | 1.0073 |
| 8.55 | 45.20 | 0.9833 | 1.0127 | 520 | 8.60 | 37.14 | 0.9858 | 1.0065 |
| 8.89 | 45.91 | 0.9855 | 1.0109 | 540 | 8.93 | 37.81 | 0.9876 | 1.0058 |
| 9.24 | 46.61 | 0.9874 | 1.0094 | 560 | 9.27 | 38.49 | 0.9891 | 1.0053 |
| 9.58 | 47.32 | 0.9890 | 1.0082 | 580 | 9.61 | 39.17 | 0.9904 | 1.0048 |
| 9.91 | 48.03 | 0.9903 | 1.0073 | 600 | 9.94 | 39.85 | 0.9915 | 1.0044 |
| 10.76 | 49.82 | 0.9928 | 1.0056 | 650 | 10.78 | 41.56 | 0.9936 | 1.0037 |
| 11.60 | 51.64 | 0.9945 | 1.0045 | 700 | 11.62 | 43.30 | 0.9951 | 1.0032 |
| ----- | | | | | | | | |
| 12.44 | 53.47 | 0.9958 | 1.0037 | 750 | 12.46 | 45.06 | 0.9962 | 1.0028 |
| 13.28 | 55.33 | 0.9967 | 1.0032 | 800 | 13.29 | 46.84 | 0.9970 | 1.0025 |
| 14.95 | 59.13 | 0.9979 | 1.0025 | 900 | 14.96 | 50.48 | 0.9981 | 1.0021 |
| 16.62 | 63.04 | 0.9987 | 1.0021 | 1000 | 16.63 | 54.23 | 0.9988 | 1.0018 |
| ----- | | | | | | | | |
| x = 0.60 | | | | | x = 0.80 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 7.28 | 26.48 | 0.9804 | 1.0044 | 440 | 7.31 | 18.47 | 0.9866 | 1.0017 |
| 7.62 | 27.12 | 0.9832 | 1.0040 | 460 | 7.64 | 19.08 | 0.9885 | 1.0017 |
| 7.95 | 27.76 | 0.9855 | 1.0037 | 480 | 7.98 | 19.69 | 0.9901 | 1.0017 |
| 8.29 | 28.40 | 0.9874 | 1.0035 | 500 | 8.31 | 20.31 | 0.9914 | 1.0017 |
| 8.63 | 29.04 | 0.9889 | 1.0032 | 520 | 8.65 | 20.93 | 0.9925 | 1.0017 |
| 8.96 | 29.69 | 0.9903 | 1.0030 | 540 | 8.98 | 21.55 | 0.9934 | 1.0017 |
| 9.30 | 30.34 | 0.9914 | 1.0029 | 560 | 9.31 | 22.17 | 0.9942 | 1.0017 |
| 9.63 | 30.99 | 0.9924 | 1.0027 | 580 | 9.65 | 22.80 | 0.9950 | 1.0016 |
| 9.97 | 31.64 | 0.9933 | 1.0026 | 600 | 9.98 | 23.43 | 0.9956 | 1.0016 |
| 10.80 | 33.29 | 0.9949 | 1.0024 | 650 | 10.82 | 25.01 | 0.9968 | 1.0016 |
| 11.64 | 34.96 | 0.9961 | 1.0021 | 700 | 11.65 | 26.61 | 0.9977 | 1.0015 |
| ----- | | | | | | | | |
| 12.47 | 36.65 | 0.9970 | 1.0020 | 750 | 12.48 | 28.23 | 0.9984 | 1.0014 |
| 13.31 | 38.36 | 0.9977 | 1.0018 | 800 | 13.31 | 29.86 | 0.9989 | 1.0013 |
| 14.97 | 41.84 | 0.9986 | 1.0016 | 900 | 14.98 | 33.19 | 0.9996 | 1.0012 |
| 16.64 | 45.41 | 0.9992 | 1.0014 | 1000 | 16.64 | 36.60 | 1.0000 | 1.0011 |

P = 0.6 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 5.86 | 48.10 | 0.9573 | 1.0646 | 440 | 5.89 | 46.19 | 0.9583 | 1.0516 |
| 6.17 | 48.89 | 0.9647 | 1.0490 | 460 | 6.19 | 46.95 | 0.9654 | 1.0399 |
| 6.47 | 49.65 | 0.9705 | 1.0382 | 480 | 6.49 | 47.69 | 0.9710 | 1.0317 |
| 6.77 | 50.41 | 0.9750 | 1.0304 | 500 | 6.79 | 48.43 | 0.9754 | 1.0256 |
| 7.07 | 51.16 | 0.9787 | 1.0247 | 520 | 7.08 | 49.16 | 0.9790 | 1.0211 |
| 7.36 | 51.90 | 0.9816 | 1.0203 | 540 | 7.37 | 49.90 | 0.9819 | 1.0176 |
| 7.65 | 52.64 | 0.9841 | 1.0170 | 560 | 7.66 | 50.63 | 0.9843 | 1.0149 |
| 7.94 | 53.38 | 0.9861 | 1.0144 | 580 | 7.95 | 51.36 | 0.9863 | 1.0128 |
| 8.22 | 54.12 | 0.9878 | 1.0124 | 600 | 8.23 | 52.09 | 0.9879 | 1.0111 |
| 8.93 | 55.98 | 0.9911 | 1.0088 | 650 | 8.94 | 53.92 | 0.9911 | 1.0081 |
| 9.64 | 57.86 | 0.9933 | 1.0067 | 700 | 9.65 | 55.78 | 0.9933 | 1.0063 |
| ----- | | | | | | | | |
| 10.34 | 59.75 | 0.9948 | 1.0053 | 750 | 10.35 | 57.65 | 0.9949 | 1.0050 |
| 11.05 | 61.67 | 0.9960 | 1.0043 | 800 | 11.05 | 59.55 | 0.9960 | 1.0042 |
| 12.44 | 65.59 | 0.9975 | 1.0032 | 900 | 12.45 | 63.44 | 0.9975 | 1.0032 |
| 13.84 | 69.63 | 0.9984 | 1.0026 | 1000 | 13.84 | 67.43 | 0.9984 | 1.0026 |
| ----- | | | | | | | | |
| x = 0.20 | | | | | x = 0.40 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 5.94 | 42.30 | 0.9612 | 1.0332 | 440 | 6.01 | 34.42 | 0.9687 | 1.0137 |
| 6.24 | 43.03 | 0.9676 | 1.0266 | 460 | 6.30 | 35.10 | 0.9735 | 1.0117 |
| 6.53 | 43.74 | 0.9726 | 1.0218 | 480 | 6.59 | 35.77 | 0.9773 | 1.0101 |
| 6.82 | 44.45 | 0.9766 | 1.0181 | 500 | 6.87 | 36.44 | 0.9804 | 1.0088 |
| 7.11 | 45.16 | 0.9799 | 1.0153 | 520 | 7.15 | 37.12 | 0.9830 | 1.0078 |
| 7.40 | 45.87 | 0.9826 | 1.0131 | 540 | 7.44 | 37.79 | 0.9851 | 1.0070 |
| 7.68 | 46.58 | 0.9849 | 1.0113 | 560 | 7.72 | 38.47 | 0.9869 | 1.0063 |
| 7.97 | 47.30 | 0.9868 | 1.0099 | 580 | 8.00 | 39.15 | 0.9885 | 1.0058 |
| 8.25 | 48.01 | 0.9883 | 1.0088 | 600 | 8.28 | 39.83 | 0.9898 | 1.0053 |
| 8.96 | 49.81 | 0.9914 | 1.0067 | 650 | 8.98 | 41.55 | 0.9923 | 1.0044 |
| 9.66 | 51.62 | 0.9935 | 1.0054 | 700 | 9.68 | 43.29 | 0.9941 | 1.0038 |
| ----- | | | | | | | | |
| 10.36 | 53.46 | 0.9950 | 1.0045 | 750 | 10.38 | 45.05 | 0.9955 | 1.0034 |
| 11.06 | 55.32 | 0.9961 | 1.0039 | 800 | 11.08 | 46.84 | 0.9964 | 1.0030 |
| 12.45 | 59.12 | 0.9975 | 1.0030 | 900 | 12.47 | 50.48 | 0.9978 | 1.0025 |
| 13.85 | 63.03 | 0.9984 | 1.0025 | 1000 | 13.86 | 54.22 | 0.9986 | 1.0022 |
| ----- | | | | | | | | |
| x = 0.60 | | | | | x = 0.80 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 6.06 | 26.46 | 0.9765 | 1.0054 | 440 | 6.09 | 18.46 | 0.9840 | 1.0020 |
| 6.34 | 27.10 | 0.9798 | 1.0049 | 460 | 6.37 | 19.07 | 0.9862 | 1.0020 |
| 6.62 | 27.74 | 0.9826 | 1.0045 | 480 | 6.65 | 19.69 | 0.9881 | 1.0021 |
| 6.90 | 28.39 | 0.9848 | 1.0042 | 500 | 6.93 | 20.31 | 0.9897 | 1.0021 |
| 7.18 | 29.03 | 0.9867 | 1.0039 | 520 | 7.20 | 20.92 | 0.9910 | 1.0020 |
| 7.46 | 29.68 | 0.9884 | 1.0037 | 540 | 7.48 | 21.55 | 0.9921 | 1.0020 |
| 7.74 | 30.33 | 0.9897 | 1.0035 | 560 | 7.76 | 22.17 | 0.9931 | 1.0020 |
| 8.02 | 30.98 | 0.9909 | 1.0033 | 580 | 8.04 | 22.80 | 0.9940 | 1.0020 |
| 8.30 | 31.64 | 0.9919 | 1.0032 | 600 | 8.32 | 23.42 | 0.9947 | 1.0020 |
| 9.00 | 33.28 | 0.9939 | 1.0028 | 650 | 9.01 | 25.01 | 0.9962 | 1.0019 |
| 9.70 | 34.95 | 0.9954 | 1.0026 | 700 | 9.71 | 26.61 | 0.9972 | 1.0018 |
| ----- | | | | | | | | |
| 10.39 | 36.64 | 0.9964 | 1.0024 | 750 | 10.40 | 28.22 | 0.9980 | 1.0017 |
| 11.09 | 38.35 | 0.9973 | 1.0022 | 800 | 11.10 | 29.86 | 0.9986 | 1.0016 |
| 12.48 | 41.84 | 0.9984 | 1.0019 | 900 | 12.49 | 33.19 | 0.9995 | 1.0015 |
| 13.87 | 45.41 | 0.9991 | 1.0017 | 1000 | 13.87 | 36.60 | 1.0000 | 1.0013 |

P = 0.8 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 4.57 | 48.70 | 0.9528 | 1.0684 | 460 | 4.60 | 46.79 | 0.9537 | 1.0552 |
| 4.81 | 49.50 | 0.9605 | 1.0528 | 480 | 4.83 | 47.56 | 0.9612 | 1.0435 |
| 5.04 | 50.28 | 0.9666 | 1.0417 | 500 | 5.06 | 48.32 | 0.9672 | 1.0350 |
| 5.26 | 51.04 | 0.9715 | 1.0337 | 520 | 5.28 | 49.07 | 0.9719 | 1.0286 |
| 5.49 | 51.80 | 0.9755 | 1.0276 | 540 | 5.50 | 49.81 | 0.9758 | 1.0239 |
| 5.71 | 52.55 | 0.9788 | 1.0230 | 560 | 5.72 | 50.55 | 0.9790 | 1.0202 |
| 5.93 | 53.30 | 0.9815 | 1.0195 | 580 | 5.94 | 51.29 | 0.9817 | 1.0173 |
| 6.14 | 54.05 | 0.9838 | 1.0167 | 600 | 6.15 | 52.02 | 0.9839 | 1.0149 |
| 6.68 | 55.92 | 0.9881 | 1.0119 | 650 | 6.69 | 53.87 | 0.9882 | 1.0109 |
| 7.22 | 57.81 | 0.9910 | 1.0089 | 700 | 7.22 | 55.74 | 0.9911 | 1.0084 |
| ----- | | | | | | | | |
| 7.75 | 59.71 | 0.9931 | 1.0071 | 750 | 7.75 | 57.62 | 0.9932 | 1.0068 |
| 8.27 | 61.64 | 0.9947 | 1.0058 | 800 | 8.28 | 59.53 | 0.9947 | 1.0056 |
| 9.33 | 65.57 | 0.9967 | 1.0043 | 900 | 9.33 | 63.41 | 0.9967 | 1.0043 |
| 10.37 | 69.61 | 0.9979 | 1.0035 | 1000 | 10.38 | 67.41 | 0.9979 | 1.0035 |
| ----- | | | | | | | | |
| x = 0.20 | | | | | x = 0.40 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 4.42 | 42.18 | 0.9482 | 1.0455 | 440 | 4.49 | 34.36 | 0.9584 | 1.0185 |
| 4.64 | 42.92 | 0.9567 | 1.0363 | 460 | 4.71 | 35.04 | 0.9647 | 1.0157 |
| 4.87 | 43.65 | 0.9635 | 1.0295 | 480 | 4.92 | 35.72 | 0.9697 | 1.0135 |
| 5.09 | 44.37 | 0.9689 | 1.0245 | 500 | 5.14 | 36.40 | 0.9739 | 1.0119 |
| 5.31 | 45.09 | 0.9733 | 1.0206 | 520 | 5.35 | 37.08 | 0.9773 | 1.0105 |
| 5.53 | 45.81 | 0.9769 | 1.0176 | 540 | 5.57 | 37.76 | 0.9802 | 1.0094 |
| 5.74 | 46.52 | 0.9798 | 1.0153 | 560 | 5.78 | 38.44 | 0.9826 | 1.0085 |
| 5.96 | 47.24 | 0.9824 | 1.0134 | 580 | 5.99 | 39.12 | 0.9847 | 1.0078 |
| 6.17 | 47.96 | 0.9845 | 1.0118 | 600 | 6.20 | 39.80 | 0.9864 | 1.0071 |
| 6.71 | 49.77 | 0.9885 | 1.0090 | 650 | 6.73 | 41.53 | 0.9898 | 1.0059 |
| 7.23 | 51.59 | 0.9913 | 1.0073 | 700 | 7.26 | 43.27 | 0.9922 | 1.0051 |
| ----- | | | | | | | | |
| 7.76 | 53.43 | 0.9933 | 1.0060 | 750 | 7.78 | 45.04 | 0.9940 | 1.0045 |
| 8.29 | 55.29 | 0.9948 | 1.0052 | 800 | 8.30 | 46.82 | 0.9953 | 1.0040 |
| 9.34 | 59.10 | 0.9967 | 1.0041 | 900 | 9.35 | 50.47 | 0.9970 | 1.0034 |
| 10.38 | 63.02 | 0.9979 | 1.0034 | 1000 | 10.39 | 54.21 | 0.9981 | 1.0029 |
| ----- | | | | | | | | |
| x = 0.60 | | | | | x = 0.80 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 4.53 | 26.43 | 0.9688 | 1.0072 | 440 | 4.56 | 18.45 | 0.9787 | 1.0027 |
| 4.75 | 27.07 | 0.9732 | 1.0066 | 460 | 4.77 | 19.06 | 0.9817 | 1.0028 |
| 4.96 | 27.72 | 0.9768 | 1.0060 | 480 | 4.98 | 19.68 | 0.9842 | 1.0028 |
| 5.17 | 28.36 | 0.9798 | 1.0056 | 500 | 5.19 | 20.30 | 0.9863 | 1.0028 |
| 5.38 | 29.01 | 0.9824 | 1.0052 | 520 | 5.40 | 20.92 | 0.9880 | 1.0027 |
| 5.59 | 29.66 | 0.9845 | 1.0049 | 540 | 5.61 | 21.54 | 0.9895 | 1.0027 |
| 5.80 | 30.31 | 0.9863 | 1.0047 | 560 | 5.82 | 22.16 | 0.9908 | 1.0027 |
| 6.02 | 30.96 | 0.9879 | 1.0044 | 580 | 6.03 | 22.79 | 0.9920 | 1.0027 |
| 6.23 | 31.62 | 0.9893 | 1.0042 | 600 | 6.24 | 23.42 | 0.9930 | 1.0026 |
| 6.75 | 33.27 | 0.9919 | 1.0038 | 650 | 6.76 | 25.00 | 0.9949 | 1.0025 |
| 7.27 | 34.94 | 0.9938 | 1.0035 | 700 | 7.28 | 26.60 | 0.9963 | 1.0024 |
| ----- | | | | | | | | |
| 7.80 | 36.63 | 0.9953 | 1.0032 | 750 | 7.81 | 28.22 | 0.9974 | 1.0023 |
| 8.32 | 38.35 | 0.9964 | 1.0030 | 800 | 8.33 | 29.86 | 0.9982 | 1.0022 |
| 9.36 | 41.83 | 0.9979 | 1.0026 | 900 | 9.37 | 33.19 | 0.9993 | 1.0020 |
| 10.40 | 45.41 | 0.9988 | 1.0023 | 1000 | 10.41 | 36.60 | 1.0000 | 1.0018 |

P = 1.0 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 3.61 | 48.51 | 0.9407 | 1.0897 | 460 | 3.64 | 46.63 | 0.9419 | 1.0717 |
| 3.81 | 49.34 | 0.9505 | 1.0685 | 480 | 3.83 | 47.43 | 0.9514 | 1.0559 |
| 4.00 | 50.14 | 0.9582 | 1.0537 | 500 | 4.02 | 48.20 | 0.9589 | 1.0447 |
| 4.18 | 50.92 | 0.9644 | 1.0431 | 520 | 4.20 | 48.96 | 0.9649 | 1.0365 |
| 4.36 | 51.70 | 0.9694 | 1.0352 | 540 | 4.38 | 49.72 | 0.9698 | 1.0303 |
| 4.54 | 52.46 | 0.9735 | 1.0293 | 560 | 4.56 | 50.47 | 0.9738 | 1.0255 |
| 4.72 | 53.22 | 0.9769 | 1.0247 | 580 | 4.73 | 51.21 | 0.9771 | 1.0218 |
| 4.90 | 53.98 | 0.9797 | 1.0211 | 600 | 4.91 | 51.96 | 0.9799 | 1.0189 |
| 5.33 | 55.87 | 0.9851 | 1.0149 | 650 | 5.34 | 53.82 | 0.9852 | 1.0137 |
| 5.76 | 57.76 | 0.9888 | 1.0112 | 700 | 5.77 | 55.70 | 0.9889 | 1.0106 |
| ----- | | | | | | | | |
| 6.19 | 59.68 | 0.9914 | 1.0089 | 750 | 6.19 | 57.59 | 0.9915 | 1.0085 |
| 6.61 | 61.61 | 0.9933 | 1.0073 | 800 | 6.62 | 59.50 | 0.9934 | 1.0071 |
| 7.03 | 63.56 | 0.9948 | 1.0062 | 850 | 7.04 | 61.43 | 0.9948 | 1.0061 |
| 7.46 | 65.55 | 0.9958 | 1.0054 | 900 | 7.46 | 63.39 | 0.9959 | 1.0054 |
| 8.30 | 69.60 | 0.9974 | 1.0044 | 1000 | 8.30 | 67.40 | 0.9974 | 1.0044 |
| ----- | | | | | | | | |
| x = 0.20 | | | | | x = 0.40 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 440 | 3.57 | 34.30 | 0.9481 | 1.0234 |
| 3.69 | 42.81 | 0.9458 | 1.0464 | 460 | 3.75 | 34.98 | 0.9559 | 1.0198 |
| 3.87 | 43.55 | 0.9543 | 1.0376 | 480 | 3.93 | 35.67 | 0.9622 | 1.0171 |
| 4.05 | 44.29 | 0.9611 | 1.0311 | 500 | 4.10 | 36.35 | 0.9674 | 1.0149 |
| 4.23 | 45.01 | 0.9666 | 1.0261 | 520 | 4.27 | 37.03 | 0.9717 | 1.0132 |
| 4.40 | 45.74 | 0.9711 | 1.0223 | 540 | 4.44 | 37.72 | 0.9753 | 1.0118 |
| 4.58 | 46.46 | 0.9748 | 1.0193 | 560 | 4.61 | 38.40 | 0.9783 | 1.0107 |
| 4.75 | 47.19 | 0.9780 | 1.0168 | 580 | 4.79 | 39.09 | 0.9808 | 1.0098 |
| 4.93 | 47.91 | 0.9806 | 1.0149 | 600 | 4.96 | 39.78 | 0.9830 | 1.0090 |
| 5.35 | 49.73 | 0.9856 | 1.0114 | 650 | 5.38 | 41.51 | 0.9873 | 1.0075 |
| 5.78 | 51.55 | 0.9891 | 1.0091 | 700 | 5.80 | 43.25 | 0.9903 | 1.0064 |
| ----- | | | | | | | | |
| 6.20 | 53.40 | 0.9916 | 1.0076 | 750 | 6.22 | 45.02 | 0.9925 | 1.0057 |
| 6.63 | 55.27 | 0.9935 | 1.0065 | 800 | 6.64 | 46.81 | 0.9941 | 1.0051 |
| 7.47 | 59.08 | 0.9959 | 1.0051 | 900 | 7.48 | 50.46 | 0.9963 | 1.0042 |
| 8.30 | 63.00 | 0.9974 | 1.0043 | 1000 | 8.32 | 54.21 | 0.9977 | 1.0036 |
| ----- | | | | | | | | |
| x = 0.60 | | | | | x = 0.80 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 3.62 | 26.40 | 0.9611 | 1.0091 | 440 | 3.65 | 18.43 | 0.9735 | 1.0034 |
| 3.79 | 27.04 | 0.9665 | 1.0083 | 460 | 3.82 | 19.05 | 0.9772 | 1.0035 |
| 3.96 | 27.69 | 0.9711 | 1.0076 | 480 | 3.99 | 19.67 | 0.9803 | 1.0035 |
| 4.13 | 28.34 | 0.9748 | 1.0071 | 500 | 4.15 | 20.29 | 0.9829 | 1.0035 |
| 4.30 | 28.99 | 0.9780 | 1.0066 | 520 | 4.32 | 20.91 | 0.9851 | 1.0035 |
| 4.47 | 29.64 | 0.9807 | 1.0062 | 540 | 4.49 | 21.53 | 0.9870 | 1.0034 |
| 4.64 | 30.29 | 0.9829 | 1.0059 | 560 | 4.66 | 22.16 | 0.9886 | 1.0034 |
| 4.81 | 30.95 | 0.9849 | 1.0056 | 580 | 4.83 | 22.78 | 0.9900 | 1.0033 |
| 4.98 | 31.61 | 0.9866 | 1.0053 | 600 | 4.99 | 23.41 | 0.9912 | 1.0033 |
| 5.40 | 33.26 | 0.9899 | 1.0048 | 650 | 5.41 | 25.00 | 0.9937 | 1.0032 |
| 5.82 | 34.93 | 0.9923 | 1.0044 | 700 | 5.83 | 26.60 | 0.9954 | 1.0030 |
| ----- | | | | | | | | |
| 6.24 | 36.63 | 0.9941 | 1.0040 | 750 | 6.25 | 28.22 | 0.9968 | 1.0029 |
| 6.65 | 38.34 | 0.9955 | 1.0037 | 800 | 6.66 | 29.86 | 0.9978 | 1.0027 |
| 7.49 | 41.83 | 0.9973 | 1.0032 | 900 | 7.50 | 33.19 | 0.9992 | 1.0025 |
| 8.32 | 45.41 | 0.9985 | 1.0028 | 1000 | 8.33 | 36.60 | 1.0000 | 1.0022 |

P = 1.5 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 2.468 | 48.91 | 0.9251 | 1.1130 | 480 | 2.495 | 47.07 | 0.9267 | 1.0904 |
| 2.605 | 49.78 | 0.9370 | 1.0868 | 500 | 2.626 | 47.90 | 0.9381 | 1.0711 |
| 2.736 | 50.62 | 0.9464 | 1.0686 | 520 | 2.754 | 48.71 | 0.9472 | 1.0573 |
| 2.864 | 51.43 | 0.9540 | 1.0554 | 540 | 2.880 | 49.49 | 0.9546 | 1.0472 |
| 2.989 | 52.23 | 0.9602 | 1.0456 | 560 | 3.00 | 50.27 | 0.9606 | 1.0395 |
| 3.11 | 53.02 | 0.9653 | 1.0382 | 580 | 3.12 | 51.03 | 0.9657 | 1.0336 |
| 3.23 | 53.79 | 0.9696 | 1.0325 | 600 | 3.24 | 51.80 | 0.9699 | 1.0289 |
| 3.53 | 55.72 | 0.9777 | 1.0228 | 650 | 3.54 | 53.69 | 0.9778 | 1.0209 |
| 3.82 | 57.65 | 0.9832 | 1.0171 | 700 | 3.83 | 55.59 | 0.9833 | 1.0160 |
| ----- | | | | | | | | |
| 4.11 | 59.58 | 0.9872 | 1.0135 | 750 | 4.11 | 57.50 | 0.9872 | 1.0129 |
| 4.39 | 61.53 | 0.9900 | 1.0110 | 800 | 4.40 | 59.42 | 0.9900 | 1.0107 |
| 4.68 | 63.50 | 0.9922 | 1.0094 | 850 | 4.68 | 61.37 | 0.9922 | 1.0092 |
| 4.96 | 65.49 | 0.9938 | 1.0082 | 900 | 4.97 | 63.34 | 0.9938 | 1.0081 |
| 5.24 | 67.51 | 0.9951 | 1.0073 | 950 | 5.25 | 65.33 | 0.9951 | 1.0073 |
| 5.52 | 69.55 | 0.9961 | 1.0066 | 1000 | 5.53 | 67.36 | 0.9961 | 1.0066 |

| x = 0.20 | | | | | x = 0.40 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 460 | 2.475 | 34.84 | 0.9341 | 1.0305 |
| 2.54 | 43.30 | 0.9314 | 1.0590 | 480 | 2.595 | 35.54 | 0.9435 | 1.0262 |
| 2.66 | 44.07 | 0.9416 | 1.0484 | 500 | 2.713 | 36.24 | 0.9512 | 1.0229 |
| 2.79 | 44.82 | 0.9499 | 1.0404 | 520 | 2.830 | 36.93 | 0.9576 | 1.0202 |
| 2.91 | 45.57 | 0.9566 | 1.0343 | 540 | 2.947 | 37.62 | 0.9630 | 1.0181 |
| 3.03 | 46.31 | 0.9623 | 1.0295 | 560 | 3.06 | 38.32 | 0.9675 | 1.0163 |
| 3.14 | 47.05 | 0.9670 | 1.0257 | 580 | 3.18 | 39.01 | 0.9713 | 1.0149 |
| 3.26 | 47.79 | 0.9709 | 1.0227 | 600 | 3.29 | 39.70 | 0.9746 | 1.0136 |
| 3.55 | 49.63 | 0.9785 | 1.0173 | 650 | 3.58 | 41.45 | 0.9809 | 1.0113 |
| 3.84 | 51.47 | 0.9837 | 1.0138 | 700 | 3.86 | 43.20 | 0.9854 | 1.0097 |
| ----- | | | | | | | | |
| 4.12 | 53.33 | 0.9874 | 1.0115 | 750 | 4.14 | 44.96 | 0.9887 | 1.0086 |
| 4.41 | 55.21 | 0.9902 | 1.0099 | 800 | 4.42 | 46.78 | 0.9912 | 1.0077 |
| 4.69 | 57.11 | 0.9923 | 1.0087 | 850 | 4.71 | 48.59 | 0.9930 | 1.0070 |
| 4.97 | 59.04 | 0.9939 | 1.0078 | 900 | 4.99 | 50.43 | 0.9945 | 1.0064 |
| 5.25 | 60.99 | 0.9951 | 1.0070 | 950 | 5.26 | 52.30 | 0.9956 | 1.0059 |
| 5.53 | 62.97 | 0.9961 | 1.0065 | 1000 | 5.54 | 54.19 | 0.9966 | 1.0055 |

| x = 0.60 | | | | | x = 0.80 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 2.401 | 26.32 | 0.9419 | 1.0140 | 440 | 2.430 | 18.40 | 0.9605 | 1.0053 |
| 2.517 | 26.97 | 0.9500 | 1.0127 | 460 | 2.544 | 19.02 | 0.9660 | 1.0053 |
| 2.632 | 27.63 | 0.9568 | 1.0116 | 480 | 2.657 | 19.64 | 0.9706 | 1.0053 |
| 2.747 | 28.28 | 0.9624 | 1.0108 | 500 | 2.769 | 20.26 | 0.9745 | 1.0053 |
| 2.861 | 28.94 | 0.9671 | 1.0101 | 520 | 2.882 | 20.89 | 0.9778 | 1.0053 |
| 2.975 | 29.59 | 0.9711 | 1.0095 | 540 | 2.994 | 21.51 | 0.9806 | 1.0052 |
| 3.09 | 30.25 | 0.9745 | 1.0089 | 560 | 3.11 | 22.14 | 0.9830 | 1.0052 |
| 3.20 | 30.91 | 0.9774 | 1.0085 | 580 | 3.22 | 22.77 | 0.9851 | 1.0051 |
| 3.32 | 31.57 | 0.9800 | 1.0081 | 600 | 3.33 | 23.40 | 0.9870 | 1.0050 |
| 3.60 | 33.23 | 0.9849 | 1.0072 | 650 | 3.61 | 24.99 | 0.9906 | 1.0048 |
| 3.88 | 34.91 | 0.9885 | 1.0066 | 700 | 3.89 | 26.59 | 0.9933 | 1.0046 |
| ----- | | | | | | | | |
| 4.16 | 36.61 | 0.9912 | 1.0061 | 750 | 4.17 | 28.21 | 0.9952 | 1.0043 |
| 4.44 | 38.32 | 0.9933 | 1.0056 | 800 | 4.45 | 29.85 | 0.9967 | 1.0041 |
| 5.00 | 41.82 | 0.9960 | 1.0049 | 900 | 5.00 | 33.19 | 0.9988 | 1.0037 |
| 5.55 | 45.40 | 0.9978 | 1.0043 | 1000 | 5.56 | 36.60 | 1.0001 | 1.0033 |

P = 2.0 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 1.907 | 49.40 | 0.9155 | 1.1253 | 480 | 1.824 | 46.69 | 0.9015 | 1.1305 |
| 2.012 | 50.30 | 0.9282 | 1.0973 | 500 | 1.930 | 47.58 | 0.9171 | 1.1009 |
| 2.113 | 51.16 | 0.9385 | 1.0776 | 520 | 2.032 | 48.43 | 0.9294 | 1.0803 |
| 2.211 | 51.99 | 0.9468 | 1.0633 | 540 | 2.129 | 49.26 | 0.9393 | 1.0654 |
| 2.306 | 52.80 | 0.9537 | 1.0526 | 560 | 2.225 | 50.06 | 0.9475 | 1.0544 |
| 2.400 | 53.60 | 0.9595 | 1.0445 | 580 | 2.319 | 50.85 | 0.9542 | 1.0460 |
| 2.492 | 54.40 | 0.9643 | 1.0382 | 600 | 2.411 | 51.63 | 0.9598 | 1.0394 |
| 2.583 | 55.18 | 0.9684 | 1.0331 | 620 | 2.502 | 52.41 | 0.9646 | 1.0343 |
| 2.673 | 55.97 | 0.9720 | 1.0291 | 640 | 2.592 | 53.18 | 0.9687 | 1.0301 |
| 2.762 | 56.75 | 0.9750 | 1.0258 | 660 | 2.681 | 53.95 | 0.9722 | 1.0267 |
| 2.850 | 57.53 | 0.9777 | 1.0231 | 680 | 2.769 | 54.72 | 0.9752 | 1.0240 |
| | | | | 700 | 2.857 | 55.49 | 0.9778 | 1.0217 |
| 3.07 | 59.48 | 0.9829 | 1.0182 | 750 | 3.07 | 57.41 | 0.9830 | 1.0174 |
| 3.29 | 61.45 | 0.9867 | 1.0149 | 800 | 3.29 | 59.35 | 0.9867 | 1.0145 |
| 3.50 | 63.43 | 0.9896 | 1.0126 | 850 | 3.50 | 61.31 | 0.9896 | 1.0124 |
| 3.71 | 65.43 | 0.9917 | 1.0110 | 900 | 3.72 | 63.28 | 0.9918 | 1.0109 |
| 4.14 | 69.51 | 0.9948 | 1.0089 | 1000 | 4.14 | 67.32 | 0.9948 | 1.0089 |

| x = 0.20 | | | | | x = 0.40 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 1.869 | 43.04 | 0.9083 | 1.0825 | 480 | 1.929 | 35.41 | 0.9249 | 1.0357 |
| 1.968 | 43.85 | 0.9221 | 1.0669 | 500 | 2.020 | 36.12 | 0.9352 | 1.0311 |
| 2.063 | 44.63 | 0.9332 | 1.0555 | 520 | 2.110 | 36.83 | 0.9437 | 1.0274 |
| 2.157 | 45.40 | 0.9422 | 1.0469 | 540 | 2.199 | 37.53 | 0.9508 | 1.0245 |
| 2.249 | 46.16 | 0.9497 | 1.0402 | 560 | 2.287 | 38.23 | 0.9567 | 1.0221 |
| 2.340 | 46.91 | 0.9560 | 1.0350 | 580 | 2.374 | 38.93 | 0.9618 | 1.0201 |
| 2.430 | 47.66 | 0.9613 | 1.0308 | 600 | 2.461 | 39.63 | 0.9662 | 1.0184 |
| 2.519 | 48.41 | 0.9658 | 1.0274 | 620 | 2.548 | 40.33 | 0.9699 | 1.0170 |
| 2.608 | 49.15 | 0.9696 | 1.0246 | 640 | 2.634 | 41.04 | 0.9732 | 1.0158 |
| 2.695 | 49.90 | 0.9729 | 1.0223 | 660 | 2.720 | 41.74 | 0.9760 | 1.0148 |
| 2.783 | 50.64 | 0.9758 | 1.0203 | 680 | 2.806 | 42.45 | 0.9784 | 1.0139 |
| 2.870 | 51.39 | 0.9783 | 1.0187 | 700 | 2.891 | 43.16 | 0.9806 | 1.0131 |
| 3.09 | 53.26 | 0.9833 | 1.0155 | 750 | 3.10 | 44.94 | 0.9850 | 1.0115 |
| 3.30 | 55.15 | 0.9870 | 1.0133 | 800 | 3.32 | 46.74 | 0.9883 | 1.0103 |
| 3.51 | 57.06 | 0.9897 | 1.0117 | 850 | 3.53 | 48.56 | 0.9907 | 1.0094 |
| 3.72 | 59.00 | 0.9919 | 1.0104 | 900 | 3.74 | 50.41 | 0.9927 | 1.0086 |
| 4.15 | 62.94 | 0.9948 | 1.0087 | 1000 | 4.16 | 54.17 | 0.9954 | 1.0074 |

| x = 0.60 | | | | | x = 0.80 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 1.880 | 26.90 | 0.9337 | 1.0172 | 440 | 1.821 | 18.36 | 0.9478 | 1.0072 |
| 1.967 | 27.56 | 0.9426 | 1.0158 | 460 | 1.907 | 18.99 | 0.9550 | 1.0072 |
| 2.055 | 28.22 | 0.9500 | 1.0146 | 480 | 1.992 | 19.61 | 0.9611 | 1.0072 |
| 2.141 | 28.88 | 0.9563 | 1.0136 | 500 | 2.077 | 20.24 | 0.9662 | 1.0072 |
| 2.227 | 29.55 | 0.9616 | 1.0128 | 520 | 2.162 | 20.86 | 0.9706 | 1.0071 |
| 2.313 | 30.21 | 0.9661 | 1.0121 | 540 | 2.246 | 21.49 | 0.9743 | 1.0070 |
| 2.399 | 30.87 | 0.9700 | 1.0114 | 560 | 2.331 | 22.12 | 0.9776 | 1.0069 |
| 2.484 | 31.53 | 0.9734 | 1.0109 | 580 | 2.415 | 22.75 | 0.9803 | 1.0068 |
| 2.697 | 33.20 | 0.9800 | 1.0098 | 600 | 2.500 | 23.39 | 0.9828 | 1.0067 |
| 2.908 | 34.89 | 0.9848 | 1.0089 | 650 | 2.710 | 24.98 | 0.9876 | 1.0064 |
| | | | | 700 | 2.919 | 26.59 | 0.9911 | 1.0061 |
| 3.12 | 36.59 | 0.9884 | 1.0081 | 750 | 3.13 | 28.21 | 0.9937 | 1.0058 |
| 3.33 | 38.31 | 0.9910 | 1.0075 | 800 | 3.34 | 29.85 | 0.9957 | 1.0055 |
| 3.75 | 41.81 | 0.9948 | 1.0065 | 900 | 3.75 | 33.19 | 0.9985 | 1.0050 |
| 4.17 | 45.39 | 0.9971 | 1.0058 | 1000 | 4.17 | 36.61 | 1.0002 | 1.0045 |

P = 3.0 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 1.284 | 49.59 | 0.8914 | 1.1667 | 520 | 1.306 | 47.85 | 0.8934 | 1.1334 |
| 1.360 | 50.56 | 0.9072 | 1.1292 | 540 | 1.378 | 48.76 | 0.9087 | 1.1064 |
| 1.431 | 51.48 | 0.9199 | 1.1032 | 560 | 1.446 | 49.63 | 0.9210 | 1.0871 |
| 1.500 | 52.36 | 0.9304 | 1.0845 | 580 | 1.513 | 50.47 | 0.9312 | 1.0728 |
| 1.566 | 53.21 | 0.9391 | 1.0706 | 600 | 1.578 | 51.29 | 0.9397 | 1.0619 |
| 1.631 | 54.05 | 0.9464 | 1.0600 | 620 | 1.641 | 52.10 | 0.9469 | 1.0534 |
| 1.695 | 54.87 | 0.9527 | 1.0517 | 640 | 1.704 | 52.90 | 0.9530 | 1.0467 |
| 1.757 | 55.68 | 0.9580 | 1.0452 | 660 | 1.765 | 53.70 | 0.9583 | 1.0413 |
| 1.819 | 56.49 | 0.9625 | 1.0399 | 680 | 1.826 | 54.49 | 0.9628 | 1.0369 |
| 1.880 | 57.29 | 0.9665 | 1.0356 | 700 | 1.887 | 55.27 | 0.9667 | 1.0333 |
| ----- | | | | | | | | |
| 2.030 | 59.29 | 0.9744 | 1.0278 | 750 | 2.035 | 57.24 | 0.9745 | 1.0266 |
| 2.177 | 61.28 | 0.9801 | 1.0228 | 800 | 2.182 | 59.20 | 0.9801 | 1.0221 |
| 2.323 | 63.29 | 0.9844 | 1.0193 | 850 | 2.327 | 61.18 | 0.9844 | 1.0190 |
| 2.467 | 65.31 | 0.9877 | 1.0168 | 900 | 2.471 | 63.18 | 0.9877 | 1.0167 |
| 2.610 | 67.35 | 0.9902 | 1.0149 | 950 | 2.614 | 65.19 | 0.9902 | 1.0149 |
| 2.753 | 69.41 | 0.9922 | 1.0135 | 1000 | 2.756 | 67.23 | 0.9922 | 1.0136 |
| ----- | | | | | | | | |
| x = 0.20 | | | | | x = 0.40 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 480 | 1.264 | 35.14 | 0.8881 | 1.0559 |
| 1.272 | 43.38 | 0.8829 | 1.1086 | 500 | 1.327 | 35.88 | 0.9033 | 1.0484 |
| 1.340 | 44.22 | 0.8997 | 1.0887 | 520 | 1.389 | 36.61 | 0.9159 | 1.0425 |
| 1.407 | 45.04 | 0.9134 | 1.0741 | 540 | 1.450 | 37.34 | 0.9265 | 1.0379 |
| 1.472 | 45.84 | 0.9246 | 1.0630 | 560 | 1.511 | 38.06 | 0.9354 | 1.0341 |
| 1.535 | 46.63 | 0.9340 | 1.0545 | 580 | 1.571 | 38.77 | 0.9429 | 1.0310 |
| 1.598 | 47.40 | 0.9420 | 1.0478 | 600 | 1.630 | 39.49 | 0.9494 | 1.0284 |
| 1.659 | 48.17 | 0.9487 | 1.0423 | 620 | 1.689 | 40.20 | 0.9550 | 1.0262 |
| 1.720 | 48.94 | 0.9544 | 1.0379 | 640 | 1.748 | 40.91 | 0.9598 | 1.0243 |
| 1.781 | 49.70 | 0.9594 | 1.0343 | 660 | 1.806 | 41.63 | 0.9641 | 1.0227 |
| 1.840 | 50.46 | 0.9637 | 1.0312 | 680 | 1.864 | 42.34 | 0.9677 | 1.0213 |
| 1.900 | 51.22 | 0.9675 | 1.0287 | 700 | 1.922 | 43.06 | 0.9710 | 1.0201 |
| ----- | | | | | | | | |
| 2.046 | 53.12 | 0.9750 | 1.0237 | 750 | 2.065 | 44.86 | 0.9775 | 1.0176 |
| 2.191 | 55.04 | 0.9805 | 1.0203 | 800 | 2.208 | 46.67 | 0.9824 | 1.0157 |
| 2.335 | 56.96 | 0.9846 | 1.0178 | 850 | 2.350 | 48.51 | 0.9862 | 1.0142 |
| 2.478 | 58.91 | 0.9878 | 1.0159 | 900 | 2.491 | 50.36 | 0.9891 | 1.0130 |
| 2.762 | 62.87 | 0.9923 | 1.0132 | 1000 | 2.773 | 54.13 | 0.9932 | 1.0111 |
| ----- | | | | | | | | |
| x = 0.60 | | | | | x = 0.80 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 440 | 1.212 | 18.30 | 0.9228 | 1.0112 |
| 1.243 | 26.76 | 0.9015 | 1.0267 | 460 | 1.270 | 18.93 | 0.9335 | 1.0112 |
| 1.303 | 27.43 | 0.9146 | 1.0244 | 480 | 1.327 | 19.56 | 0.9424 | 1.0111 |
| 1.362 | 28.11 | 0.9256 | 1.0226 | 500 | 1.385 | 20.19 | 0.9501 | 1.0110 |
| 1.421 | 28.78 | 0.9349 | 1.0210 | 520 | 1.442 | 20.82 | 0.9565 | 1.0109 |
| 1.480 | 29.45 | 0.9428 | 1.0197 | 540 | 1.499 | 21.46 | 0.9621 | 1.0108 |
| 1.538 | 30.12 | 0.9495 | 1.0185 | 560 | 1.555 | 22.09 | 0.9668 | 1.0106 |
| 1.596 | 30.79 | 0.9553 | 1.0175 | 580 | 1.612 | 22.72 | 0.9709 | 1.0104 |
| 1.653 | 31.46 | 0.9603 | 1.0167 | 600 | 1.669 | 23.36 | 0.9745 | 1.0102 |
| 1.796 | 33.14 | 0.9702 | 1.0149 | 650 | 1.809 | 24.96 | 0.9817 | 1.0098 |
| 1.939 | 34.84 | 0.9774 | 1.0135 | 700 | 1.950 | 26.57 | 0.9869 | 1.0093 |
| ----- | | | | | | | | |
| 2.080 | 36.55 | 0.9827 | 1.0123 | 750 | 2.090 | 28.20 | 0.9908 | 1.0088 |
| 2.221 | 38.28 | 0.9867 | 1.0114 | 800 | 2.230 | 29.85 | 0.9938 | 1.0083 |
| 2.502 | 41.79 | 0.9922 | 1.0099 | 900 | 2.508 | 33.19 | 0.9978 | 1.0075 |
| 2.781 | 45.38 | 0.9957 | 1.0087 | 1000 | 2.787 | 36.61 | 1.0003 | 1.0067 |

| x = 0.05 | | | | | x = 0.10 | | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|--|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| 0.915 | 48.78 | 0.8536 | 1.2582 | 520 | 0.940 | 47.21 | 0.8569 | 1.1991 | |
| 0.980 | 49.91 | 0.8754 | 1.1931 | 540 | 1.000 | 48.22 | 0.8777 | 1.1549 | |
| 1.039 | 50.93 | 0.8928 | 1.1505 | 560 | 1.056 | 49.17 | 0.8944 | 1.1245 | |
| 1.095 | 51.89 | 0.9070 | 1.1210 | 580 | 1.109 | 50.07 | 0.9082 | 1.1027 | |
| 1.149 | 52.80 | 0.9187 | 1.0997 | 600 | 1.161 | 50.94 | 0.9196 | 1.0865 | |
| 1.200 | 53.68 | 0.9285 | 1.0839 | 620 | 1.211 | 51.79 | 0.9292 | 1.0742 | |
| 1.250 | 54.54 | 0.9368 | 1.0718 | 640 | 1.260 | 52.62 | 0.9374 | 1.0645 | |
| 1.299 | 55.39 | 0.9439 | 1.0624 | 660 | 1.308 | 53.44 | 0.9444 | 1.0568 | |
| 1.347 | 56.22 | 0.9501 | 1.0549 | 680 | 1.355 | 54.25 | 0.9504 | 1.0506 | |
| 1.394 | 57.05 | 0.9554 | 1.0488 | 700 | 1.401 | 55.06 | 0.9556 | 1.0455 | |
| ----- | | | | | | | | | |
| 1.510 | 59.09 | 0.9658 | 1.0379 | 750 | 1.516 | 57.06 | 0.9660 | 1.0362 | |
| 1.623 | 61.12 | 0.9735 | 1.0309 | 800 | 1.628 | 59.05 | 0.9736 | 1.0300 | |
| 1.734 | 63.15 | 0.9792 | 1.0261 | 850 | 1.738 | 61.05 | 0.9792 | 1.0257 | |
| 1.843 | 65.19 | 0.9836 | 1.0227 | 900 | 1.847 | 63.07 | 0.9836 | 1.0226 | |
| 1.952 | 67.24 | 0.9870 | 1.0202 | 950 | 1.955 | 65.10 | 0.9870 | 1.0202 | |
| 2.060 | 69.32 | 0.9896 | 1.0183 | 1000 | 2.063 | 67.15 | 0.9896 | 1.0183 | |
| ----- | | | | | | | | | |
| x = 0.20 | | | | | x = 0.40 | | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| | | | | 500 | 0.980 | 35.64 | 0.8718 | 1.0670 | |
| 0.978 | 43.79 | 0.8662 | 1.1264 | 520 | 1.028 | 36.40 | 0.8885 | 1.0586 | |
| 1.031 | 44.67 | 0.8845 | 1.1043 | 540 | 1.076 | 37.14 | 0.9024 | 1.0520 | |
| 1.083 | 45.51 | 0.8996 | 1.0879 | 560 | 1.123 | 37.88 | 0.9142 | 1.0467 | |
| 1.133 | 46.33 | 0.9121 | 1.0755 | 580 | 1.169 | 38.61 | 0.9242 | 1.0424 | |
| 1.181 | 47.14 | 0.9227 | 1.0659 | 600 | 1.214 | 39.34 | 0.9328 | 1.0388 | |
| 1.229 | 47.93 | 0.9317 | 1.0582 | 620 | 1.259 | 40.07 | 0.9402 | 1.0357 | |
| 1.276 | 48.72 | 0.9393 | 1.0520 | 640 | 1.304 | 40.79 | 0.9466 | 1.0331 | |
| 1.323 | 49.50 | 0.9459 | 1.0469 | 660 | 1.349 | 41.51 | 0.9522 | 1.0309 | |
| 1.369 | 50.28 | 0.9517 | 1.0426 | 680 | 1.393 | 42.24 | 0.9571 | 1.0289 | |
| 1.414 | 51.05 | 0.9567 | 1.0391 | 700 | 1.437 | 42.96 | 0.9614 | 1.0272 | |
| ----- | | | | | | | | | |
| 1.527 | 52.98 | 0.9666 | 1.0323 | 750 | 1.546 | 44.78 | 0.9701 | 1.0238 | |
| 1.637 | 54.92 | 0.9740 | 1.0275 | 800 | 1.654 | 46.60 | 0.9767 | 1.0212 | |
| 1.746 | 56.86 | 0.9795 | 1.0241 | 850 | 1.761 | 48.45 | 0.9816 | 1.0192 | |
| 1.855 | 58.82 | 0.9838 | 1.0215 | 900 | 1.868 | 50.31 | 0.9855 | 1.0175 | |
| 1.962 | 60.80 | 0.9871 | 1.0194 | 950 | 1.974 | 52.19 | 0.9886 | 1.0162 | |
| 2.069 | 62.80 | 0.9897 | 1.0178 | 1000 | 2.080 | 54.10 | 0.9910 | 1.0150 | |
| ----- | | | | | | | | | |
| x = 0.60 | | | | | x = 0.80 | | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| | | | | 460 | 0.952 | 18.87 | 0.9126 | 1.0153 | |
| 0.971 | 27.30 | 0.8872 | 1.0335 | 480 | 0.995 | 19.51 | 0.9243 | 1.0152 | |
| 1.016 | 27.99 | 0.9017 | 1.0309 | 500 | 1.039 | 20.15 | 0.9343 | 1.0150 | |
| 1.061 | 28.67 | 0.9138 | 1.0287 | 520 | 1.082 | 20.78 | 0.9428 | 1.0148 | |
| 1.106 | 29.36 | 0.9242 | 1.0268 | 540 | 1.125 | 21.42 | 0.9501 | 1.0146 | |
| 1.150 | 30.03 | 0.9331 | 1.0252 | 560 | 1.168 | 22.06 | 0.9564 | 1.0144 | |
| 1.194 | 30.71 | 0.9408 | 1.0238 | 580 | 1.211 | 22.70 | 0.9618 | 1.0141 | |
| 1.238 | 31.39 | 0.9474 | 1.0226 | 600 | 1.253 | 23.34 | 0.9666 | 1.0138 | |
| 1.346 | 33.09 | 0.9605 | 1.0201 | 650 | 1.359 | 24.94 | 0.9760 | 1.0132 | |
| 1.454 | 34.79 | 0.9700 | 1.0182 | 700 | 1.465 | 26.56 | 0.9829 | 1.0125 | |
| ----- | | | | | | | | | |
| 1.561 | 36.51 | 0.9771 | 1.0166 | 750 | 1.570 | 28.19 | 0.9880 | 1.0118 | |
| 1.667 | 38.25 | 0.9824 | 1.0153 | 800 | 1.676 | 29.84 | 0.9919 | 1.0112 | |
| 1.878 | 41.77 | 0.9898 | 1.0132 | 900 | 1.885 | 33.19 | 0.9973 | 1.0100 | |
| 2.089 | 45.37 | 0.9944 | 1.0116 | 1000 | 2.094 | 36.62 | 1.0006 | 1.0090 | |

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 0.748 | 49.17 | 0.8430 | 1.2740 | 540 | 0.771 | 47.64 | 0.8463 | 1.2129 |
| 0.802 | 50.33 | 0.8653 | 1.2072 | 560 | 0.820 | 48.68 | 0.8676 | 1.1677 |
| 0.851 | 51.39 | 0.8834 | 1.1632 | 580 | 0.866 | 49.65 | 0.8850 | 1.1363 |
| 0.897 | 52.37 | 0.8982 | 1.1326 | 600 | 0.910 | 50.57 | 0.8994 | 1.1136 |
| 0.941 | 53.30 | 0.9106 | 1.1103 | 620 | 0.952 | 51.46 | 0.9115 | 1.0966 |
| 0.983 | 54.21 | 0.9210 | 1.0937 | 640 | 0.993 | 52.32 | 0.9217 | 1.0835 |
| 1.024 | 55.09 | 0.9299 | 1.0808 | 660 | 1.032 | 53.17 | 0.9305 | 1.0733 |
| 1.064 | 55.95 | 0.9376 | 1.0708 | 680 | 1.072 | 54.01 | 0.9380 | 1.0651 |
| 1.103 | 56.80 | 0.9442 | 1.0627 | 700 | 1.110 | 54.84 | 0.9445 | 1.0584 |
| ----- | | | | | | | | |
| 1.198 | 58.89 | 0.9573 | 1.0485 | 750 | 1.204 | 56.88 | 0.9575 | 1.0462 |
| 1.290 | 60.95 | 0.9669 | 1.0394 | 800 | 1.295 | 58.90 | 0.9670 | 1.0382 |
| 1.380 | 63.00 | 0.9740 | 1.0332 | 850 | 1.385 | 60.93 | 0.9741 | 1.0327 |
| 1.469 | 65.07 | 0.9795 | 1.0288 | 900 | 1.473 | 62.96 | 0.9795 | 1.0286 |
| 1.557 | 67.14 | 0.9837 | 1.0256 | 950 | 1.561 | 65.00 | 0.9837 | 1.0256 |
| 1.644 | 69.23 | 0.9871 | 1.0231 | 1000 | 1.647 | 67.07 | 0.9871 | 1.0232 |

| x = 0.20 | | | | | x = 0.40 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 520 | 0.812 | 36.18 | 0.8614 | 1.0757 |
| 0.805 | 44.27 | 0.8557 | 1.1379 | 540 | 0.851 | 36.95 | 0.8786 | 1.0670 |
| 0.849 | 45.17 | 0.8746 | 1.1152 | 560 | 0.890 | 37.70 | 0.8932 | 1.0600 |
| 0.891 | 46.03 | 0.8903 | 1.0982 | 580 | 0.928 | 38.45 | 0.9056 | 1.0543 |
| 0.931 | 46.87 | 0.9035 | 1.0852 | 600 | 0.965 | 39.19 | 0.9163 | 1.0496 |
| 0.971 | 47.69 | 0.9147 | 1.0750 | 620 | 1.002 | 39.93 | 0.9255 | 1.0456 |
| 1.010 | 48.50 | 0.9243 | 1.0668 | 640 | 1.038 | 40.67 | 0.9335 | 1.0422 |
| 1.048 | 49.30 | 0.9325 | 1.0601 | 660 | 1.075 | 41.40 | 0.9404 | 1.0393 |
| 1.086 | 50.09 | 0.9397 | 1.0545 | 680 | 1.110 | 42.13 | 0.9465 | 1.0368 |
| 1.123 | 50.88 | 0.9459 | 1.0499 | 700 | 1.146 | 42.86 | 0.9519 | 1.0346 |
| ----- | | | | | | | | |
| 1.215 | 52.84 | 0.9583 | 1.0411 | 750 | 1.234 | 44.70 | 0.9628 | 1.0302 |
| 1.305 | 54.80 | 0.9675 | 1.0350 | 800 | 1.322 | 46.54 | 0.9709 | 1.0269 |
| 1.393 | 56.76 | 0.9744 | 1.0306 | 850 | 1.408 | 48.39 | 0.9771 | 1.0242 |
| 1.481 | 58.73 | 0.9798 | 1.0272 | 900 | 1.494 | 50.26 | 0.9820 | 1.0221 |
| 1.567 | 60.73 | 0.9839 | 1.0246 | 950 | 1.580 | 52.15 | 0.9858 | 1.0204 |
| 1.654 | 62.74 | 0.9872 | 1.0225 | 1000 | 1.665 | 54.06 | 0.9888 | 1.0189 |

| x = 0.60 | | | | | x = 0.80 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 460 | 0.761 | 18.81 | 0.8923 | 1.0196 |
| | | | | 480 | 0.796 | 19.46 | 0.9068 | 1.0194 |
| 0.809 | 27.88 | 0.8782 | 1.0396 | 500 | 0.831 | 20.10 | 0.9190 | 1.0192 |
| 0.845 | 28.57 | 0.8932 | 1.0367 | 520 | 0.866 | 20.74 | 0.9295 | 1.0189 |
| 0.882 | 29.26 | 0.9060 | 1.0342 | 540 | 0.901 | 21.39 | 0.9385 | 1.0185 |
| 0.918 | 29.95 | 0.9170 | 1.0321 | 560 | 0.936 | 22.03 | 0.9462 | 1.0182 |
| 0.953 | 30.63 | 0.9265 | 1.0303 | 580 | 0.970 | 22.67 | 0.9530 | 1.0179 |
| 0.989 | 31.32 | 0.9347 | 1.0287 | 600 | 1.004 | 23.31 | 0.9588 | 1.0175 |
| 1.077 | 33.03 | 0.9510 | 1.0255 | 650 | 1.090 | 24.93 | 0.9705 | 1.0166 |
| 1.163 | 34.75 | 0.9628 | 1.0230 | 700 | 1.174 | 26.55 | 0.9790 | 1.0157 |
| ----- | | | | | | | | |
| 1.249 | 36.47 | 0.9716 | 1.0210 | 750 | 1.259 | 28.19 | 0.9854 | 1.0149 |
| 1.335 | 38.22 | 0.9782 | 1.0193 | 800 | 1.343 | 29.84 | 0.9902 | 1.0141 |
| 1.420 | 39.97 | 0.9834 | 1.0179 | 850 | 1.427 | 31.51 | 0.9939 | 1.0133 |
| 1.504 | 41.75 | 0.9874 | 1.0167 | 900 | 1.511 | 33.20 | 0.9968 | 1.0126 |
| 1.589 | 43.54 | 0.9905 | 1.0156 | 950 | 1.595 | 34.90 | 0.9991 | 1.0119 |
| 1.673 | 45.36 | 0.9931 | 1.0146 | 1000 | 1.678 | 36.62 | 1.0009 | 1.0113 |

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 540 | 0.616 | 47.00 | 0.8145 | 1.2836 |
| 0.642 | 49.68 | 0.8375 | 1.2765 | 560 | 0.662 | 48.15 | 0.8406 | 1.2179 |
| 0.687 | 50.84 | 0.8596 | 1.2125 | 580 | 0.703 | 49.20 | 0.8618 | 1.1742 |
| 0.728 | 51.91 | 0.8776 | 1.1697 | 600 | 0.742 | 50.18 | 0.8792 | 1.1435 |
| 0.767 | 52.91 | 0.8926 | 1.1396 | 620 | 0.779 | 51.12 | 0.8938 | 1.1210 |
| 0.804 | 53.86 | 0.9052 | 1.1174 | 640 | 0.814 | 52.02 | 0.9061 | 1.1040 |
| 0.840 | 54.77 | 0.9159 | 1.1007 | 660 | 0.849 | 52.90 | 0.9166 | 1.0908 |
| 0.874 | 55.67 | 0.9251 | 1.0877 | 680 | 0.883 | 53.76 | 0.9256 | 1.0803 |
| 0.908 | 56.54 | 0.9331 | 1.0774 | 700 | 0.915 | 54.61 | 0.9335 | 1.0718 |
| ----- | | | | | | | | |
| 0.990 | 58.68 | 0.9488 | 1.0595 | 750 | 0.996 | 56.69 | 0.9490 | 1.0566 |
| 1.068 | 60.78 | 0.9603 | 1.0481 | 800 | 1.073 | 58.75 | 0.9604 | 1.0467 |
| 1.145 | 62.86 | 0.9689 | 1.0405 | 850 | 1.149 | 60.80 | 0.9689 | 1.0398 |
| 1.220 | 64.94 | 0.9754 | 1.0351 | 900 | 1.224 | 62.85 | 0.9754 | 1.0348 |
| 1.294 | 67.03 | 0.9805 | 1.0311 | 950 | 1.297 | 64.91 | 0.9805 | 1.0311 |
| 1.367 | 69.14 | 0.9845 | 1.0281 | 1000 | 1.370 | 66.98 | 0.9845 | 1.0282 |
| ----- | | | | | | | | |
| x = 0.20 | | | | | x = 0.40 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 520 | 0.668 | 35.96 | 0.8347 | 1.0939 |
| 0.653 | 43.86 | 0.8268 | 1.1757 | 540 | 0.702 | 36.75 | 0.8551 | 1.0828 |
| 0.692 | 44.81 | 0.8496 | 1.1451 | 560 | 0.735 | 37.52 | 0.8724 | 1.0739 |
| 0.729 | 45.72 | 0.8685 | 1.1228 | 580 | 0.767 | 38.29 | 0.8872 | 1.0667 |
| 0.764 | 46.59 | 0.8843 | 1.1059 | 600 | 0.799 | 39.05 | 0.8999 | 1.0608 |
| 0.799 | 47.44 | 0.8977 | 1.0928 | 620 | 0.830 | 39.80 | 0.9109 | 1.0559 |
| 0.832 | 48.27 | 0.9092 | 1.0823 | 640 | 0.861 | 40.54 | 0.9204 | 1.0516 |
| 0.865 | 49.09 | 0.9191 | 1.0739 | 660 | 0.892 | 41.29 | 0.9287 | 1.0481 |
| 0.897 | 49.90 | 0.9277 | 1.0669 | 680 | 0.922 | 42.03 | 0.9360 | 1.0449 |
| 0.929 | 50.70 | 0.9351 | 1.0611 | 700 | 0.952 | 42.77 | 0.9425 | 1.0422 |
| ----- | | | | | | | | |
| 1.007 | 52.70 | 0.9501 | 1.0502 | 750 | 1.027 | 44.62 | 0.9555 | 1.0368 |
| 1.083 | 54.68 | 0.9611 | 1.0427 | 800 | 1.100 | 46.47 | 0.9652 | 1.0326 |
| 1.158 | 56.66 | 0.9694 | 1.0372 | 850 | 1.173 | 48.33 | 0.9727 | 1.0294 |
| 1.231 | 58.65 | 0.9758 | 1.0331 | 900 | 1.245 | 50.21 | 0.9784 | 1.0268 |
| 1.304 | 60.65 | 0.9807 | 1.0298 | 950 | 1.316 | 52.11 | 0.9830 | 1.0246 |
| 1.377 | 62.67 | 0.9847 | 1.0273 | 1000 | 1.388 | 54.03 | 0.9866 | 1.0228 |
| ----- | | | | | | | | |
| x = 0.60 | | | | | x = 0.80 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 460 | 0.634 | 18.76 | 0.8727 | 1.0241 |
| | | | | 480 | 0.664 | 19.41 | 0.8897 | 1.0238 |
| 0.671 | 27.76 | 0.8552 | 1.0486 | 500 | 0.693 | 20.06 | 0.9042 | 1.0234 |
| 0.702 | 28.47 | 0.8730 | 1.0449 | 520 | 0.723 | 20.71 | 0.9165 | 1.0230 |
| 0.733 | 29.17 | 0.8881 | 1.0418 | 540 | 0.752 | 21.35 | 0.9272 | 1.0226 |
| 0.763 | 29.86 | 0.9012 | 1.0392 | 560 | 0.781 | 22.00 | 0.9364 | 1.0221 |
| 0.793 | 30.56 | 0.9124 | 1.0370 | 580 | 0.810 | 22.64 | 0.9443 | 1.0217 |
| 0.823 | 31.25 | 0.9222 | 1.0350 | 600 | 0.838 | 23.29 | 0.9513 | 1.0212 |
| 0.897 | 32.97 | 0.9416 | 1.0310 | 650 | 0.910 | 24.91 | 0.9651 | 1.0201 |
| 0.970 | 34.70 | 0.9557 | 1.0279 | 700 | 0.981 | 26.54 | 0.9752 | 1.0190 |
| ----- | | | | | | | | |
| 1.042 | 36.44 | 0.9662 | 1.0254 | 750 | 1.051 | 28.18 | 0.9828 | 1.0180 |
| 1.113 | 38.19 | 0.9741 | 1.0233 | 800 | 1.122 | 29.84 | 0.9885 | 1.0170 |
| 1.184 | 39.95 | 0.9802 | 1.0216 | 850 | 1.192 | 31.51 | 0.9929 | 1.0160 |
| 1.255 | 41.73 | 0.9850 | 1.0201 | 900 | 1.262 | 33.20 | 0.9964 | 1.0152 |
| 1.326 | 43.53 | 0.9888 | 1.0188 | 950 | 1.332 | 34.91 | 0.9991 | 1.0143 |
| 1.396 | 45.35 | 0.9918 | 1.0176 | 1000 | 1.401 | 36.63 | 1.0012 | 1.0136 |

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 560 | 0.460 | 46.98 | 0.7857 | 1.3479 |
| 0.478 | 49.62 | 0.8112 | 1.3411 | 580 | 0.497 | 48.24 | 0.8149 | 1.2667 |
| 0.515 | 50.91 | 0.8360 | 1.2610 | 600 | 0.531 | 49.36 | 0.8386 | 1.2136 |
| 0.549 | 52.05 | 0.8564 | 1.2085 | 620 | 0.562 | 50.41 | 0.8582 | 1.1766 |
| 0.580 | 53.12 | 0.8734 | 1.1719 | 640 | 0.591 | 51.39 | 0.8748 | 1.1496 |
| 0.609 | 54.12 | 0.8878 | 1.1452 | 660 | 0.619 | 52.34 | 0.8888 | 1.1292 |
| 0.637 | 55.08 | 0.9002 | 1.1251 | 680 | 0.646 | 53.25 | 0.9009 | 1.1134 |
| 0.664 | 56.01 | 0.9108 | 1.1095 | 700 | 0.672 | 54.15 | 0.9114 | 1.1008 |
| ----- | | | | | | | | |
| 0.729 | 58.26 | 0.9318 | 1.0829 | 750 | 0.735 | 56.32 | 0.9321 | 1.0787 |
| 0.791 | 60.43 | 0.9471 | 1.0666 | 800 | 0.796 | 58.44 | 0.9473 | 1.0645 |
| 0.850 | 62.57 | 0.9586 | 1.0557 | 850 | 0.855 | 60.54 | 0.9586 | 1.0547 |
| 0.908 | 64.69 | 0.9673 | 1.0481 | 900 | 0.912 | 62.62 | 0.9673 | 1.0477 |
| 0.965 | 66.82 | 0.9741 | 1.0426 | 950 | 0.968 | 64.71 | 0.9741 | 1.0425 |
| 1.021 | 68.95 | 0.9794 | 1.0383 | 1000 | 1.024 | 66.81 | 0.9794 | 1.0384 |
| ----- | | | | | | | | |
| x = 0.20 | | | | | x = 0.40 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 540 | 0.515 | 36.34 | 0.8092 | 1.1167 |
| 0.496 | 44.06 | 0.7998 | 1.2145 | 560 | 0.541 | 37.16 | 0.8318 | 1.1037 |
| 0.526 | 45.06 | 0.8251 | 1.1783 | 580 | 0.566 | 37.96 | 0.8511 | 1.0932 |
| 0.555 | 46.01 | 0.8462 | 1.1518 | 600 | 0.591 | 38.75 | 0.8677 | 1.0846 |
| 0.583 | 46.92 | 0.8641 | 1.1317 | 620 | 0.616 | 39.53 | 0.8821 | 1.0775 |
| 0.610 | 47.81 | 0.8793 | 1.1161 | 640 | 0.640 | 40.29 | 0.8947 | 1.0714 |
| 0.636 | 48.67 | 0.8924 | 1.1036 | 660 | 0.664 | 41.06 | 0.9056 | 1.0663 |
| 0.662 | 49.52 | 0.9038 | 1.0934 | 680 | 0.687 | 41.82 | 0.9153 | 1.0619 |
| 0.686 | 50.35 | 0.9137 | 1.0850 | 700 | 0.710 | 42.57 | 0.9238 | 1.0580 |
| ----- | | | | | | | | |
| 0.747 | 52.41 | 0.9336 | 1.0694 | 750 | 0.767 | 44.45 | 0.9410 | 1.0503 |
| 0.806 | 54.43 | 0.9482 | 1.0587 | 800 | 0.823 | 46.33 | 0.9539 | 1.0445 |
| 0.863 | 56.45 | 0.9593 | 1.0510 | 850 | 0.879 | 48.22 | 0.9638 | 1.0400 |
| 0.920 | 58.47 | 0.9678 | 1.0452 | 900 | 0.933 | 50.12 | 0.9715 | 1.0363 |
| 0.975 | 60.50 | 0.9744 | 1.0407 | 950 | 0.988 | 52.03 | 0.9775 | 1.0333 |
| 1.030 | 62.54 | 0.9797 | 1.0371 | 1000 | 1.042 | 53.96 | 0.9824 | 1.0308 |
| ----- | | | | | | | | |
| x = 0.60 | | | | | x = 0.80 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 480 | 0.498 | 19.32 | 0.8572 | 1.0328 |
| | | | | 500 | 0.521 | 19.98 | 0.8758 | 1.0322 |
| 0.522 | 28.26 | 0.8338 | 1.0622 | 520 | 0.543 | 20.63 | 0.8917 | 1.0315 |
| 0.546 | 28.98 | 0.8534 | 1.0577 | 540 | 0.565 | 21.29 | 0.9055 | 1.0309 |
| 0.570 | 29.70 | 0.8704 | 1.0540 | 560 | 0.587 | 21.94 | 0.9174 | 1.0302 |
| 0.593 | 30.41 | 0.8850 | 1.0508 | 580 | 0.609 | 22.60 | 0.9278 | 1.0295 |
| 0.616 | 31.11 | 0.8978 | 1.0479 | 600 | 0.631 | 23.25 | 0.9368 | 1.0289 |
| 0.638 | 31.81 | 0.9090 | 1.0455 | 620 | 0.653 | 23.90 | 0.9447 | 1.0282 |
| 0.661 | 32.51 | 0.9188 | 1.0432 | 640 | 0.674 | 24.55 | 0.9517 | 1.0276 |
| 0.683 | 33.21 | 0.9274 | 1.0413 | 660 | 0.696 | 25.21 | 0.9578 | 1.0269 |
| 0.706 | 33.91 | 0.9350 | 1.0395 | 680 | 0.717 | 25.86 | 0.9633 | 1.0263 |
| 0.728 | 34.61 | 0.9417 | 1.0379 | 700 | 0.739 | 26.52 | 0.9681 | 1.0257 |
| ----- | | | | | | | | |
| 0.782 | 36.37 | 0.9555 | 1.0344 | 750 | 0.792 | 28.17 | 0.9780 | 1.0242 |
| 0.837 | 38.13 | 0.9660 | 1.0316 | 800 | 0.845 | 29.83 | 0.9855 | 1.0229 |
| 0.890 | 39.91 | 0.9741 | 1.0291 | 850 | 0.898 | 31.51 | 0.9912 | 1.0216 |
| 0.944 | 41.69 | 0.9804 | 1.0271 | 900 | 0.950 | 33.21 | 0.9957 | 1.0204 |
| 0.997 | 43.50 | 0.9854 | 1.0253 | 950 | 1.003 | 34.92 | 0.9993 | 1.0192 |
| 1.050 | 45.33 | 0.9894 | 1.0237 | 1000 | 1.055 | 36.65 | 1.0020 | 1.0182 |

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 0.348 | 48.14 | 0.7612 | 1.5362 | 580 | 0.371 | 47.13 | 0.7672 | 1.3908 |
| 0.385 | 49.75 | 0.7938 | 1.3849 | 600 | 0.402 | 48.46 | 0.7977 | 1.3018 |
| 0.416 | 51.11 | 0.8199 | 1.2959 | 620 | 0.430 | 49.64 | 0.8226 | 1.2435 |
| 0.444 | 52.31 | 0.8416 | 1.2378 | 640 | 0.456 | 50.72 | 0.8435 | 1.2028 |
| 0.470 | 53.42 | 0.8597 | 1.1973 | 660 | 0.480 | 51.75 | 0.8612 | 1.1730 |
| 0.495 | 54.47 | 0.8753 | 1.1678 | 680 | 0.504 | 52.72 | 0.8763 | 1.1505 |
| 0.518 | 55.46 | 0.8886 | 1.1455 | 700 | 0.526 | 53.67 | 0.8894 | 1.1328 |
| ----- | | | | | | | | |
| 0.540 | 56.43 | 0.9002 | 1.1281 | 720 | 0.548 | 54.59 | 0.9008 | 1.1188 |
| 0.562 | 57.36 | 0.9103 | 1.1143 | 740 | 0.569 | 55.49 | 0.9108 | 1.1074 |
| 0.583 | 58.28 | 0.9192 | 1.1032 | 760 | 0.589 | 56.38 | 0.9196 | 1.0980 |
| 0.604 | 59.19 | 0.9270 | 1.0940 | 780 | 0.610 | 57.26 | 0.9273 | 1.0901 |
| 0.624 | 60.08 | 0.9340 | 1.0863 | 800 | 0.629 | 58.13 | 0.9342 | 1.0834 |
| 0.673 | 62.27 | 0.9483 | 1.0719 | 850 | 0.678 | 60.27 | 0.9484 | 1.0705 |
| 0.721 | 64.44 | 0.9592 | 1.0618 | 900 | 0.725 | 62.40 | 0.9593 | 1.0613 |
| 0.767 | 66.60 | 0.9677 | 1.0545 | 950 | 0.771 | 64.52 | 0.9677 | 1.0544 |
| 0.813 | 68.76 | 0.9743 | 1.0490 | 1000 | 0.816 | 66.65 | 0.9743 | 1.0491 |

| x = 0.20 | | | | | x = 0.40 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 560 | 0.425 | 36.79 | 0.7923 | 1.1360 |
| 0.404 | 44.37 | 0.7820 | 1.2439 | 580 | 0.446 | 37.63 | 0.8159 | 1.1217 |
| 0.429 | 45.40 | 0.8084 | 1.2046 | 600 | 0.467 | 38.45 | 0.8363 | 1.1100 |
| 0.453 | 46.39 | 0.8307 | 1.1756 | 620 | 0.487 | 39.25 | 0.8540 | 1.1004 |
| 0.476 | 47.33 | 0.8497 | 1.1535 | 640 | 0.507 | 40.05 | 0.8694 | 1.0924 |
| 0.499 | 48.23 | 0.8660 | 1.1361 | 660 | 0.527 | 40.83 | 0.8830 | 1.0855 |
| 0.520 | 49.12 | 0.8802 | 1.1222 | 680 | 0.546 | 41.61 | 0.8949 | 1.0796 |
| 0.541 | 49.99 | 0.8925 | 1.1108 | 700 | 0.565 | 42.38 | 0.9054 | 1.0746 |
| ----- | | | | | | | | |
| 0.561 | 50.85 | 0.9033 | 1.1013 | 720 | 0.584 | 43.15 | 0.9147 | 1.0701 |
| 0.581 | 51.69 | 0.9129 | 1.0933 | 740 | 0.603 | 43.91 | 0.9229 | 1.0662 |
| 0.601 | 52.53 | 0.9213 | 1.0865 | 760 | 0.621 | 44.68 | 0.9303 | 1.0627 |
| 0.620 | 53.36 | 0.9288 | 1.0807 | 780 | 0.639 | 45.44 | 0.9369 | 1.0596 |
| 0.640 | 54.19 | 0.9355 | 1.0756 | 800 | 0.657 | 46.20 | 0.9428 | 1.0568 |
| 0.687 | 56.24 | 0.9492 | 1.0654 | 850 | 0.702 | 48.11 | 0.9551 | 1.0509 |
| 0.733 | 58.29 | 0.9598 | 1.0578 | 900 | 0.747 | 50.02 | 0.9646 | 1.0461 |
| 0.778 | 60.34 | 0.9681 | 1.0519 | 950 | 0.791 | 51.95 | 0.9722 | 1.0423 |
| 0.823 | 62.41 | 0.9747 | 1.0472 | 1000 | 0.834 | 53.89 | 0.9782 | 1.0390 |

| x = 0.60 | | | | | x = 0.80 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 480 | 0.399 | 19.23 | 0.8267 | 1.0422 |
| | | | | 500 | 0.418 | 19.90 | 0.8490 | 1.0413 |
| 0.415 | 28.06 | 0.7965 | 1.0803 | 520 | 0.436 | 20.57 | 0.8683 | 1.0404 |
| 0.435 | 28.80 | 0.8202 | 1.0744 | 540 | 0.454 | 21.23 | 0.8850 | 1.0394 |
| 0.454 | 29.53 | 0.8408 | 1.0694 | 560 | 0.472 | 21.89 | 0.8994 | 1.0385 |
| 0.473 | 30.26 | 0.8587 | 1.0651 | 580 | 0.489 | 22.55 | 0.9120 | 1.0376 |
| 0.492 | 30.98 | 0.8743 | 1.0614 | 600 | 0.507 | 23.21 | 0.9231 | 1.0367 |
| 0.538 | 32.76 | 0.9054 | 1.0539 | 650 | 0.550 | 24.85 | 0.9452 | 1.0346 |
| 0.583 | 34.53 | 0.9282 | 1.0482 | 700 | 0.594 | 26.50 | 0.9614 | 1.0325 |
| ----- | | | | | | | | |
| 0.627 | 36.30 | 0.9453 | 1.0437 | 750 | 0.636 | 28.16 | 0.9735 | 1.0306 |
| 0.671 | 38.08 | 0.9582 | 1.0399 | 800 | 0.679 | 29.83 | 0.9827 | 1.0288 |
| 0.714 | 39.86 | 0.9682 | 1.0368 | 850 | 0.721 | 31.52 | 0.9898 | 1.0272 |
| 0.757 | 41.66 | 0.9760 | 1.0342 | 900 | 0.763 | 33.21 | 0.9953 | 1.0256 |
| 0.800 | 43.48 | 0.9822 | 1.0318 | 950 | 0.806 | 34.93 | 0.9996 | 1.0242 |
| 0.843 | 45.31 | 0.9871 | 1.0298 | 1000 | 0.848 | 36.66 | 1.0030 | 1.0229 |

| x = 0.05 | | | | | x = 0.10 | | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|--|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| | | | | 600 | 0.2252 | 45.69 | 0.6931 | 1.6640 | |
| 0.2312 | 48.15 | 0.7264 | 1.6683 | 620 | 0.2516 | 47.41 | 0.7331 | 1.4868 | |
| 0.2586 | 49.96 | 0.7611 | 1.4834 | 640 | 0.2742 | 48.86 | 0.7654 | 1.3820 | |
| 0.2816 | 51.45 | 0.7894 | 1.3761 | 660 | 0.2944 | 50.13 | 0.7923 | 1.3131 | |
| 0.302 | 52.77 | 0.8131 | 1.3062 | 680 | 0.313 | 51.31 | 0.8152 | 1.2645 | |
| 0.321 | 53.98 | 0.8333 | 1.2573 | 700 | 0.330 | 52.40 | 0.8349 | 1.2286 | |
| ----- | | | | | ----- | | | | |
| 0.339 | 55.10 | 0.8508 | 1.2215 | 720 | 0.347 | 53.45 | 0.8519 | 1.2012 | |
| 0.355 | 56.17 | 0.8660 | 1.1943 | 740 | 0.363 | 54.46 | 0.8669 | 1.1796 | |
| 0.371 | 57.20 | 0.8793 | 1.1730 | 760 | 0.378 | 55.43 | 0.8800 | 1.1622 | |
| 0.387 | 58.19 | 0.8911 | 1.1559 | 780 | 0.393 | 56.38 | 0.8916 | 1.1479 | |
| 0.402 | 59.16 | 0.9015 | 1.1420 | 800 | 0.407 | 57.32 | 0.9019 | 1.1360 | |
| 0.437 | 61.52 | 0.9228 | 1.1164 | 850 | 0.442 | 59.60 | 0.9230 | 1.1135 | |
| 0.471 | 63.80 | 0.9392 | 1.0991 | 900 | 0.476 | 61.83 | 0.9393 | 1.0977 | |
| 0.504 | 66.06 | 0.9518 | 1.0867 | 950 | 0.508 | 64.03 | 0.9519 | 1.0862 | |
| 0.536 | 68.29 | 0.9618 | 1.0775 | 1000 | 0.540 | 66.22 | 0.9618 | 1.0773 | |
| ----- | | | | | ----- | | | | |
| x = 0.20 | | | | | x = 0.40 | | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| | | | | 580 | 0.287 | 36.80 | 0.7329 | 1.2017 | |
| 0.261 | 43.76 | 0.7156 | 1.3758 | 600 | 0.302 | 37.70 | 0.7617 | 1.1806 | |
| 0.280 | 44.96 | 0.7488 | 1.3119 | 620 | 0.317 | 38.57 | 0.7869 | 1.1635 | |
| 0.298 | 46.06 | 0.7770 | 1.2661 | 640 | 0.331 | 39.43 | 0.8090 | 1.1494 | |
| 0.315 | 47.11 | 0.8012 | 1.2318 | 660 | 0.345 | 40.26 | 0.8285 | 1.1376 | |
| 0.331 | 48.10 | 0.8221 | 1.2051 | 680 | 0.359 | 41.09 | 0.8457 | 1.1275 | |
| 0.347 | 49.06 | 0.8403 | 1.1840 | 700 | 0.372 | 41.90 | 0.8609 | 1.1189 | |
| ----- | | | | | ----- | | | | |
| 0.362 | 50.00 | 0.8563 | 1.1667 | 720 | 0.385 | 42.70 | 0.8745 | 1.1113 | |
| 0.376 | 50.91 | 0.8704 | 1.1525 | 740 | 0.398 | 43.50 | 0.8866 | 1.1047 | |
| 0.391 | 51.81 | 0.8829 | 1.1405 | 760 | 0.411 | 44.30 | 0.8974 | 1.0989 | |
| 0.405 | 52.69 | 0.8940 | 1.1303 | 780 | 0.424 | 45.09 | 0.9070 | 1.0937 | |
| 0.418 | 53.57 | 0.9040 | 1.1215 | 800 | 0.437 | 45.87 | 0.9157 | 1.0891 | |
| 0.452 | 55.72 | 0.9245 | 1.1042 | 850 | 0.468 | 47.83 | 0.9338 | 1.0794 | |
| 0.484 | 57.85 | 0.9403 | 1.0914 | 900 | 0.498 | 49.79 | 0.9480 | 1.0717 | |
| 0.515 | 59.96 | 0.9526 | 1.0816 | 950 | 0.528 | 51.75 | 0.9591 | 1.0654 | |
| 0.546 | 62.08 | 0.9624 | 1.0739 | 1000 | 0.558 | 53.72 | 0.9680 | 1.0601 | |
| ----- | | | | | ----- | | | | |
| x = 0.60 | | | | | x = 0.80 | | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| | | | | 500 | 0.281 | 19.73 | 0.7890 | 1.0652 | |
| | | | | 520 | 0.293 | 20.42 | 0.8154 | 1.0635 | |
| 0.287 | 28.37 | 0.7440 | 1.1187 | 540 | 0.306 | 21.10 | 0.8384 | 1.0618 | |
| 0.301 | 29.14 | 0.7723 | 1.1102 | 560 | 0.318 | 21.78 | 0.8585 | 1.0602 | |
| 0.314 | 29.90 | 0.7972 | 1.1030 | 580 | 0.330 | 22.45 | 0.8762 | 1.0586 | |
| 0.327 | 30.65 | 0.8191 | 1.0967 | 600 | 0.342 | 23.12 | 0.8918 | 1.0571 | |
| 0.340 | 31.40 | 0.8385 | 1.0913 | 620 | 0.354 | 23.79 | 0.9054 | 1.0556 | |
| 0.352 | 32.14 | 0.8556 | 1.0865 | 640 | 0.365 | 24.46 | 0.9175 | 1.0541 | |
| 0.365 | 32.87 | 0.8707 | 1.0822 | 660 | 0.377 | 25.13 | 0.9282 | 1.0527 | |
| 0.377 | 33.60 | 0.8842 | 1.0783 | 680 | 0.389 | 25.80 | 0.9378 | 1.0514 | |
| 0.390 | 34.33 | 0.8962 | 1.0749 | 700 | 0.400 | 26.47 | 0.9463 | 1.0501 | |
| ----- | | | | | ----- | | | | |
| 0.420 | 36.14 | 0.9208 | 1.0675 | 750 | 0.429 | 28.15 | 0.9637 | 1.0469 | |
| 0.450 | 37.95 | 0.9397 | 1.0615 | 800 | 0.458 | 29.84 | 0.9769 | 1.0441 | |
| 0.479 | 39.77 | 0.9543 | 1.0565 | 850 | 0.486 | 31.53 | 0.9871 | 1.0415 | |
| 0.508 | 41.59 | 0.9657 | 1.0523 | 900 | 0.514 | 33.24 | 0.9950 | 1.0390 | |
| 0.537 | 43.42 | 0.9747 | 1.0486 | 950 | 0.543 | 34.97 | 1.0012 | 1.0368 | |
| 0.566 | 45.27 | 0.9820 | 1.0454 | 1000 | 0.571 | 36.71 | 1.0061 | 1.0347 | |

P = 20 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|-------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 620 | 0.1577 | 44.58 | 0.6415 | 1.9478 |
| 0.1590 | 46.79 | 0.6780 | 1.9872 | 640 | 0.1807 | 46.65 | 0.6873 | 1.6703 |
| 0.1838 | 49.05 | 0.7184 | 1.6772 | 660 | 0.1999 | 48.31 | 0.7242 | 1.5171 |
| 0.2038 | 50.81 | 0.7511 | 1.5143 | 680 | 0.2167 | 49.74 | 0.7550 | 1.4200 |
| 0.2212 | 52.31 | 0.7785 | 1.4135 | 700 | 0.2321 | 51.04 | 0.7813 | 1.3531 |
| - - - | - - - | - - - | - - - | - - - | - - - | - - - | - - - | - - - |
| 0.237 | 53.65 | 0.8020 | 1.3452 | 720 | 0.246 | 52.24 | 0.8039 | 1.3045 |
| 0.251 | 54.88 | 0.8222 | 1.2960 | 740 | 0.260 | 53.36 | 0.8237 | 1.2676 |
| 0.265 | 56.04 | 0.8400 | 1.2592 | 760 | 0.272 | 54.44 | 0.8411 | 1.2388 |
| 0.278 | 57.15 | 0.8556 | 1.2306 | 780 | 0.285 | 55.48 | 0.8564 | 1.2157 |
| 0.290 | 58.21 | 0.8694 | 1.2078 | 800 | 0.296 | 56.49 | 0.8700 | 1.1968 |
| 0.319 | 60.74 | 0.8977 | 1.1673 | 850 | 0.325 | 58.91 | 0.8981 | 1.1619 |
| 0.347 | 63.15 | 0.9194 | 1.1408 | 900 | 0.351 | 61.25 | 0.9196 | 1.1381 |
| 0.373 | 65.50 | 0.9362 | 1.1222 | 950 | 0.377 | 63.54 | 0.9363 | 1.1209 |
| 0.398 | 67.81 | 0.9495 | 1.1084 | 1000 | 0.401 | 65.80 | 0.9495 | 1.1078 |

| x = 0.20 | | | | | x = 0.40 | | | |
|-----------------------------------|----------------------|----------|----------|-------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 580 | 0.2079 | 35.99 | 0.6578 | 1.2938 |
| | | | | 600 | 0.2203 | 36.97 | 0.6935 | 1.2607 |
| 0.1931 | 43.41 | 0.6701 | 1.4978 | 620 | 0.2322 | 37.91 | 0.7251 | 1.2343 |
| 0.2088 | 44.73 | 0.7071 | 1.4122 | 640 | 0.2436 | 38.82 | 0.7529 | 1.2128 |
| 0.2234 | 45.93 | 0.7387 | 1.3513 | 660 | 0.2548 | 39.71 | 0.7776 | 1.1949 |
| 0.2370 | 47.05 | 0.7660 | 1.3059 | 680 | 0.2656 | 40.58 | 0.7995 | 1.1798 |
| 0.2499 | 48.11 | 0.7898 | 1.2709 | 700 | 0.2763 | 41.43 | 0.8190 | 1.1670 |
| - - - | - - - | - - - | - - - | - - - | - - - | - - - | - - - | - - - |
| 0.262 | 49.13 | 0.8108 | 1.2431 | 720 | 0.287 | 42.28 | 0.8364 | 1.1559 |
| 0.274 | 50.12 | 0.8292 | 1.2205 | 740 | 0.297 | 43.11 | 0.8520 | 1.1462 |
| 0.286 | 51.08 | 0.8456 | 1.2018 | 760 | 0.307 | 43.93 | 0.8660 | 1.1377 |
| 0.297 | 52.02 | 0.8602 | 1.1861 | 780 | 0.317 | 44.75 | 0.8785 | 1.1301 |
| 0.308 | 52.95 | 0.8732 | 1.1728 | 800 | 0.327 | 45.56 | 0.8898 | 1.1234 |
| 0.334 | 55.20 | 0.9002 | 1.1467 | 850 | 0.350 | 47.57 | 0.9135 | 1.1094 |
| 0.360 | 57.41 | 0.9211 | 1.1278 | 900 | 0.374 | 49.57 | 0.9320 | 1.0984 |
| 0.384 | 59.59 | 0.9375 | 1.1135 | 950 | 0.397 | 51.57 | 0.9467 | 1.0895 |
| 0.408 | 61.75 | 0.9505 | 1.1022 | 1000 | 0.420 | 53.57 | 0.9584 | 1.0821 |

| x = 0.60 | | | | | x = 0.80 | | | |
|-----------------------------------|----------------------|----------|----------|-------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 520 | 0.2225 | 20.29 | 0.7698 | 1.0878 |
| | | | | 540 | 0.2319 | 20.99 | 0.7980 | 1.0853 |
| 0.2247 | 28.78 | 0.7118 | 1.1537 | 560 | 0.2411 | 21.68 | 0.8228 | 1.0829 |
| 0.2351 | 29.58 | 0.7423 | 1.1432 | 580 | 0.2503 | 22.37 | 0.8448 | 1.0805 |
| 0.2452 | 30.36 | 0.7694 | 1.1341 | 600 | 0.2594 | 23.05 | 0.8642 | 1.0783 |
| 0.2552 | 31.13 | 0.7936 | 1.1262 | 620 | 0.2684 | 23.74 | 0.8814 | 1.0761 |
| 0.2650 | 31.89 | 0.8150 | 1.1193 | 640 | 0.2773 | 24.42 | 0.8967 | 1.0740 |
| 0.2747 | 32.65 | 0.8342 | 1.1132 | 660 | 0.2862 | 25.09 | 0.9102 | 1.0720 |
| 0.2842 | 33.40 | 0.8512 | 1.1077 | 680 | 0.2951 | 25.77 | 0.9223 | 1.0700 |
| 0.2937 | 34.14 | 0.8665 | 1.1028 | 700 | 0.3039 | 26.45 | 0.9331 | 1.0682 |
| - - - | - - - | - - - | - - - | - - - | - - - | - - - | - - - | - - - |
| 0.317 | 36.00 | 0.8982 | 1.0923 | 750 | 0.326 | 28.15 | 0.9553 | 1.0638 |
| 0.340 | 37.84 | 0.9225 | 1.0838 | 800 | 0.347 | 29.85 | 0.9723 | 1.0598 |
| 0.362 | 39.68 | 0.9414 | 1.0769 | 850 | 0.369 | 31.55 | 0.9854 | 1.0561 |
| 0.384 | 41.52 | 0.9562 | 1.0709 | 900 | 0.390 | 33.27 | 0.9956 | 1.0527 |
| 0.406 | 43.37 | 0.9680 | 1.0658 | 950 | 0.411 | 35.01 | 1.0036 | 1.0496 |
| 0.428 | 45.24 | 0.9774 | 1.0614 | 1000 | 0.432 | 36.76 | 1.0099 | 1.0468 |

P = 25 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 0.0891 | 41.80 | 0.5869 | 3.5560 | 640 | 0.1230 | 44.01 | 0.6091 | 2.1737 |
| 0.1214 | 45.96 | 0.6460 | 2.2647 | 660 | 0.1424 | 46.25 | 0.6570 | 1.8263 |
| 0.1430 | 48.49 | 0.6893 | 1.8495 | 680 | 0.1586 | 48.04 | 0.6960 | 1.6361 |
| 0.1604 | 50.43 | 0.7244 | 1.6394 | 700 | 0.1729 | 49.58 | 0.7289 | 1.5165 |
| - - - - - | | | | | | | | |
| 0.1753 | 52.06 | 0.7539 | 1.5121 | 720 | 0.1859 | 50.96 | 0.7571 | 1.4345 |
| 0.1887 | 53.50 | 0.7793 | 1.4269 | 740 | 0.1979 | 52.23 | 0.7816 | 1.3750 |
| 0.2010 | 54.82 | 0.8013 | 1.3662 | 760 | 0.2091 | 53.42 | 0.8031 | 1.3301 |
| 0.2126 | 56.05 | 0.8207 | 1.3207 | 780 | 0.2198 | 54.55 | 0.8221 | 1.2949 |
| 0.2234 | 57.22 | 0.8379 | 1.2856 | 800 | 0.2300 | 55.64 | 0.8389 | 1.2667 |
| 0.2487 | 59.94 | 0.8731 | 1.2252 | 850 | 0.2541 | 58.22 | 0.8736 | 1.2160 |
| 0.2720 | 62.49 | 0.8999 | 1.1871 | 900 | 0.2766 | 60.67 | 0.9003 | 1.1823 |
| 0.2939 | 64.94 | 0.9209 | 1.1609 | 950 | 0.2979 | 63.04 | 0.9210 | 1.1584 |
| 0.3149 | 67.33 | 0.9374 | 1.1418 | 1000 | 0.3184 | 65.37 | 0.9375 | 1.1405 |
| - - - - - | | | | | | | | |
| x = 0.20 | | | | | x = 0.40 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 0.1254 | 39.98 | 0.5424 | 1.9944 | 600 | 0.1723 | 36.28 | 0.6323 | 1.3495 |
| 0.1416 | 41.79 | 0.5959 | 1.7503 | 620 | 0.1823 | 37.28 | 0.6688 | 1.3120 |
| 0.1559 | 43.34 | 0.6408 | 1.6002 | 640 | 0.1919 | 38.25 | 0.7014 | 1.2818 |
| 0.1689 | 44.72 | 0.6792 | 1.4993 | 660 | 0.2013 | 39.19 | 0.7305 | 1.2569 |
| 0.1810 | 45.97 | 0.7124 | 1.4272 | 680 | 0.2103 | 40.10 | 0.7565 | 1.2361 |
| 0.1923 | 47.15 | 0.7415 | 1.3732 | 700 | 0.2192 | 40.99 | 0.7797 | 1.2185 |
| - - - - - | | | | | | | | |
| 0.2030 | 48.26 | 0.7670 | 1.3313 | 720 | 0.2278 | 41.86 | 0.8006 | 1.2033 |
| 0.2132 | 49.33 | 0.7895 | 1.2980 | 740 | 0.2363 | 42.73 | 0.8194 | 1.1902 |
| 0.2231 | 50.35 | 0.8096 | 1.2708 | 760 | 0.2446 | 43.58 | 0.8362 | 1.1787 |
| 0.2327 | 51.35 | 0.8274 | 1.2483 | 780 | 0.2528 | 44.42 | 0.8514 | 1.1686 |
| 0.2419 | 52.32 | 0.8434 | 1.2293 | 800 | 0.2608 | 45.25 | 0.8651 | 1.1596 |
| 0.264 | 54.68 | 0.8767 | 1.1929 | 850 | 0.280 | 47.32 | 0.8940 | 1.1408 |
| 0.285 | 56.97 | 0.9024 | 1.1669 | 900 | 0.300 | 49.36 | 0.9167 | 1.1262 |
| 0.305 | 59.21 | 0.9227 | 1.1473 | 950 | 0.318 | 51.39 | 0.9347 | 1.1144 |
| 0.325 | 61.43 | 0.9388 | 1.1322 | 1000 | 0.337 | 53.42 | 0.9491 | 1.1047 |
| - - - - - | | | | | | | | |
| x = 0.60 | | | | | x = 0.80 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 520 | 0.1805 | 20.19 | 0.7308 | 1.1133 |
| | | | | 540 | 0.1881 | 20.90 | 0.7631 | 1.1098 |
| 0.1800 | 28.46 | 0.6589 | 1.1992 | 560 | 0.1956 | 21.61 | 0.7918 | 1.1064 |
| 0.1884 | 29.28 | 0.6938 | 1.1851 | 580 | 0.2030 | 22.31 | 0.8174 | 1.1032 |
| 0.1967 | 30.09 | 0.7250 | 1.1731 | 600 | 0.2103 | 23.00 | 0.8401 | 1.1002 |
| 0.2049 | 30.89 | 0.7531 | 1.1626 | 620 | 0.2176 | 23.69 | 0.8603 | 1.0973 |
| 0.2129 | 31.67 | 0.7782 | 1.1535 | 640 | 0.2248 | 24.38 | 0.8784 | 1.0945 |
| 0.2208 | 32.45 | 0.8008 | 1.1454 | 660 | 0.2320 | 25.07 | 0.8945 | 1.0918 |
| 0.2286 | 33.21 | 0.8210 | 1.1381 | 680 | 0.2391 | 25.75 | 0.9088 | 1.0892 |
| 0.2363 | 33.98 | 0.8392 | 1.1316 | 700 | 0.2462 | 26.44 | 0.9217 | 1.0867 |
| - - - - - | | | | | | | | |
| 0.255 | 35.86 | 0.8772 | 1.1179 | 750 | 0.264 | 28.15 | 0.9483 | 1.0810 |
| 0.274 | 37.73 | 0.9065 | 1.1068 | 800 | 0.281 | 29.86 | 0.9687 | 1.0758 |
| 0.292 | 39.60 | 0.9294 | 1.0977 | 850 | 0.298 | 31.58 | 0.9845 | 1.0710 |
| 0.310 | 41.46 | 0.9475 | 1.0900 | 900 | 0.315 | 33.31 | 0.9968 | 1.0667 |
| 0.328 | 43.33 | 0.9618 | 1.0834 | 950 | 0.332 | 35.05 | 1.0065 | 1.0627 |
| 0.345 | 45.21 | 0.9733 | 1.0777 | 1000 | 0.349 | 36.81 | 1.0141 | 1.0591 |

P = 30 MPa

| x = 0.05 | | | | | x = 0.10 | | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|--|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| 0.0777 | 41.98 | 0.5715 | 3.620 | 660 | 0.1043 | 43.97 | 0.5916 | 2.305 | |
| 0.1014 | 45.76 | 0.6276 | 2.432 | 680 | 0.1201 | 46.21 | 0.6388 | 1.940 | |
| 0.1193 | 48.33 | 0.6710 | 1.978 | 700 | 0.1337 | 48.04 | 0.6781 | 1.732 | |
| ----- | | | | | | | | | |
| 0.1340 | 50.34 | 0.7068 | 1.7417 | 720 | 0.1458 | 49.63 | 0.7117 | 1.5981 | |
| 0.1469 | 52.04 | 0.7373 | 1.5969 | 740 | 0.1569 | 51.06 | 0.7407 | 1.5058 | |
| 0.1584 | 53.54 | 0.7636 | 1.4995 | 760 | 0.1671 | 52.37 | 0.7662 | 1.4383 | |
| 0.1690 | 54.92 | 0.7867 | 1.4298 | 780 | 0.1768 | 53.61 | 0.7887 | 1.3870 | |
| 0.1790 | 56.20 | 0.8071 | 1.3775 | 800 | 0.1860 | 54.78 | 0.8086 | 1.3468 | |
| 0.2016 | 59.13 | 0.8489 | 1.2909 | 850 | 0.2073 | 57.52 | 0.8497 | 1.2762 | |
| 0.2222 | 61.82 | 0.8809 | 1.2382 | 900 | 0.2270 | 60.08 | 0.8813 | 1.2306 | |
| 0.2414 | 64.37 | 0.9058 | 1.2029 | 950 | 0.2455 | 62.55 | 0.9061 | 1.1987 | |
| 0.2596 | 66.85 | 0.9255 | 1.1777 | 1000 | 0.2633 | 64.95 | 0.9256 | 1.1753 | |
| ----- | | | | | | | | | |
| x = 0.20 | | | | | x = 0.40 | | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| | | | | 620 | 0.1499 | 36.70 | 0.6184 | 1.3958 | |
| 0.1217 | 41.96 | 0.5794 | 1.8373 | 640 | 0.1582 | 37.71 | 0.6547 | 1.3558 | |
| 0.1334 | 43.51 | 0.6236 | 1.6798 | 660 | 0.1662 | 38.69 | 0.6874 | 1.3231 | |
| 0.1443 | 44.91 | 0.6620 | 1.5711 | 680 | 0.1740 | 39.64 | 0.7168 | 1.2959 | |
| 0.1544 | 46.19 | 0.6956 | 1.4920 | 700 | 0.1816 | 40.57 | 0.7433 | 1.2730 | |
| ----- | | | | | | | | | |
| 0.1639 | 47.40 | 0.7253 | 1.4321 | 720 | 0.1890 | 41.48 | 0.7672 | 1.2534 | |
| 0.1730 | 48.54 | 0.7516 | 1.3853 | 740 | 0.1963 | 42.37 | 0.7887 | 1.2365 | |
| 0.1817 | 49.63 | 0.7750 | 1.3477 | 760 | 0.2034 | 43.24 | 0.8082 | 1.2217 | |
| 0.1901 | 50.69 | 0.7959 | 1.3169 | 780 | 0.2104 | 44.11 | 0.8258 | 1.2088 | |
| 0.1982 | 51.71 | 0.8147 | 1.2913 | 800 | 0.2173 | 44.97 | 0.8417 | 1.1973 | |
| 0.2175 | 54.17 | 0.8538 | 1.2427 | 850 | 0.2340 | 47.08 | 0.8754 | 1.1735 | |
| 0.2358 | 56.54 | 0.8843 | 1.2085 | 900 | 0.2504 | 49.16 | 0.9021 | 1.1550 | |
| 0.2533 | 58.84 | 0.9083 | 1.1831 | 950 | 0.2663 | 51.22 | 0.9233 | 1.1402 | |
| 0.2702 | 61.11 | 0.9274 | 1.1636 | 1000 | 0.2819 | 53.28 | 0.9403 | 1.1280 | |
| ----- | | | | | | | | | |
| x = 0.60 | | | | | x = 0.80 | | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| | | | | 540 | 0.1592 | 20.84 | 0.7331 | 1.1352 | |
| | | | | 560 | 0.1655 | 21.55 | 0.7650 | 1.1309 | |
| 0.1579 | 29.03 | 0.6511 | 1.2286 | 580 | 0.1717 | 22.26 | 0.7935 | 1.1267 | |
| 0.1649 | 29.86 | 0.6856 | 1.2134 | 600 | 0.1778 | 22.96 | 0.8190 | 1.1228 | |
| 0.1718 | 30.67 | 0.7168 | 1.2003 | 620 | 0.1839 | 23.66 | 0.8419 | 1.1191 | |
| 0.1786 | 31.47 | 0.7450 | 1.1887 | 640 | 0.1899 | 24.36 | 0.8624 | 1.1155 | |
| 0.1853 | 32.27 | 0.7705 | 1.1786 | 660 | 0.1959 | 25.05 | 0.8807 | 1.1121 | |
| 0.1919 | 33.05 | 0.7934 | 1.1695 | 680 | 0.2019 | 25.75 | 0.8972 | 1.1089 | |
| 0.1984 | 33.83 | 0.8142 | 1.1613 | 700 | 0.2078 | 26.44 | 0.9119 | 1.1058 | |
| ----- | | | | | | | | | |
| 0.214 | 35.74 | 0.8577 | 1.1441 | 750 | 0.222 | 28.16 | 0.9425 | 1.0986 | |
| 0.230 | 37.64 | 0.8917 | 1.1303 | 800 | 0.237 | 29.89 | 0.9661 | 1.0921 | |
| 0.245 | 39.53 | 0.9183 | 1.1190 | 850 | 0.251 | 31.62 | 0.9844 | 1.0862 | |
| 0.260 | 41.41 | 0.9394 | 1.1095 | 900 | 0.266 | 33.36 | 0.9987 | 1.0809 | |
| 0.275 | 43.30 | 0.9562 | 1.1013 | 950 | 0.280 | 35.10 | 1.0100 | 1.0760 | |
| 0.290 | 45.19 | 0.9697 | 1.0943 | 1000 | 0.294 | 36.87 | 1.0188 | 1.0715 | |

P = 40 MPa

| x = 0.05 | | | | | x = 0.10 | | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|--|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| 0.0439 | 36.44 | 0.4507 | 8.034 | 660 | 0.0630 | 39.71 | 0.4772 | 3.892 | |
| 0.0560 | 40.26 | 0.5142 | 4.809 | 680 | 0.0754 | 42.55 | 0.5348 | 2.898 | |
| 0.0704 | 43.80 | 0.5704 | 3.230 | 700 | 0.0869 | 44.93 | 0.5844 | 2.366 | |
| ----- | | | | | | | | | |
| 0.0838 | 46.64 | 0.6175 | 2.493 | 720 | 0.0974 | 46.95 | 0.6270 | 2.053 | |
| 0.0955 | 48.94 | 0.6574 | 2.105 | 740 | 0.1069 | 48.70 | 0.6641 | 1.8528 | |
| 0.1059 | 50.87 | 0.6918 | 1.8724 | 760 | 0.1157 | 50.28 | 0.6966 | 1.7154 | |
| 0.1153 | 52.57 | 0.7218 | 1.7200 | 780 | 0.1239 | 51.72 | 0.7254 | 1.6160 | |
| 0.1240 | 54.11 | 0.7482 | 1.6131 | 800 | 0.1316 | 53.07 | 0.7510 | 1.5410 | |
| 0.1433 | 57.48 | 0.8025 | 1.4490 | 850 | 0.1494 | 56.13 | 0.8040 | 1.4160 | |
| 0.1604 | 60.48 | 0.8440 | 1.3566 | 900 | 0.1655 | 58.93 | 0.8449 | 1.3396 | |
| 0.1762 | 63.25 | 0.8766 | 1.2977 | 950 | 0.1805 | 61.57 | 0.8771 | 1.2881 | |
| 0.1909 | 65.89 | 0.9024 | 1.2570 | 1000 | 0.1946 | 64.11 | 0.9027 | 1.2512 | |
| ----- | | | | | | | | | |
| x = 0.20 | | | | | x = 0.40 | | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| | | | | 620 | 0.1111 | 35.69 | 0.5343 | 1.5783 | |
| | | | | 640 | 0.1175 | 36.78 | 0.5754 | 1.5165 | |
| 0.0919 | 41.27 | 0.5267 | 2.1392 | 660 | 0.1237 | 37.83 | 0.6130 | 1.4664 | |
| 0.1006 | 42.90 | 0.5723 | 1.9291 | 680 | 0.1298 | 38.84 | 0.6475 | 1.4250 | |
| 0.1089 | 44.38 | 0.6130 | 1.7814 | 700 | 0.1357 | 39.82 | 0.6789 | 1.3902 | |
| ----- | | | | | | | | | |
| 0.1167 | 45.75 | 0.6493 | 1.6729 | 720 | 0.1414 | 40.78 | 0.7075 | 1.3607 | |
| 0.1240 | 47.04 | 0.6818 | 1.5904 | 740 | 0.1471 | 41.72 | 0.7336 | 1.3354 | |
| 0.1311 | 48.25 | 0.7109 | 1.5258 | 760 | 0.1526 | 42.64 | 0.7574 | 1.3133 | |
| 0.1379 | 49.42 | 0.7371 | 1.4739 | 780 | 0.1580 | 43.55 | 0.7791 | 1.2941 | |
| 0.1445 | 50.54 | 0.7608 | 1.4315 | 800 | 0.1634 | 44.44 | 0.7989 | 1.2771 | |
| 0.1600 | 53.19 | 0.8105 | 1.3530 | 850 | 0.1764 | 46.63 | 0.8411 | 1.2422 | |
| 0.1745 | 55.71 | 0.8496 | 1.2993 | 900 | 0.1890 | 48.78 | 0.8748 | 1.2153 | |
| 0.1884 | 58.13 | 0.8806 | 1.2603 | 950 | 0.2013 | 50.91 | 0.9019 | 1.1939 | |
| 0.2017 | 60.50 | 0.9055 | 1.2307 | 1000 | 0.2133 | 53.02 | 0.9238 | 1.1764 | |
| ----- | | | | | | | | | |
| x = 0.60 | | | | | x = 0.80 | | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| | | | | 540 | 0.1238 | 20.77 | 0.6867 | 1.1886 | |
| | | | | 560 | 0.1285 | 21.50 | 0.7232 | 1.1820 | |
| | | | | 580 | 0.1331 | 22.22 | 0.7562 | 1.1758 | |
| 0.1261 | 29.48 | 0.6203 | 1.2975 | 600 | 0.1377 | 22.94 | 0.7855 | 1.1702 | |
| 0.1314 | 30.32 | 0.6560 | 1.2787 | 620 | 0.1423 | 23.65 | 0.8125 | 1.1647 | |
| 0.1365 | 31.15 | 0.6886 | 1.2622 | 640 | 0.1468 | 24.36 | 0.8369 | 1.1594 | |
| 0.1416 | 31.97 | 0.7185 | 1.2476 | 660 | 0.1513 | 25.06 | 0.8589 | 1.1545 | |
| 0.1466 | 32.78 | 0.7456 | 1.2347 | 680 | 0.1558 | 25.76 | 0.8786 | 1.1498 | |
| 0.1516 | 33.58 | 0.7705 | 1.2230 | 700 | 0.1602 | 26.46 | 0.8966 | 1.1453 | |
| ----- | | | | | | | | | |
| 0.1637 | 35.55 | 0.8233 | 1.1985 | 750 | 0.1713 | 28.21 | 0.9341 | 1.1350 | |
| 0.1756 | 37.49 | 0.8652 | 1.1790 | 800 | 0.1822 | 29.95 | 0.9634 | 1.1258 | |
| 0.1873 | 39.42 | 0.8985 | 1.1630 | 850 | 0.1931 | 31.70 | 0.9862 | 1.1175 | |
| 0.1987 | 41.33 | 0.9251 | 1.1495 | 900 | 0.2038 | 33.45 | 1.0042 | 1.1100 | |
| 0.2101 | 43.25 | 0.9465 | 1.1381 | 950 | 0.2145 | 35.21 | 1.0183 | 1.1032 | |
| 0.2212 | 45.17 | 0.9637 | 1.1282 | 1000 | 0.2252 | 36.99 | 1.0294 | 1.0970 | |

P = 50 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------------|----------------|-----------|-----------------------------------|----------------------|----------------|----------------|
| V | H | φ ₁ | φ ₂ | T | V | H | φ ₁ | φ ₂ |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 0.0366 | 34.64 | 0.3788 | 10.644 | 660 | 0.0476 | 37.13 | 0.3986 | 5.656 |
| 0.0422 | 37.45 | 0.4348 | 7.284 | 680 | 0.0552 | 39.80 | 0.4545 | 4.168 |
| 0.0498 | 40.46 | 0.4897 | 5.031 | 700 | 0.0633 | 42.29 | 0.5068 | 3.251 |
| - - - - - | - - - - - | - - - - - | - - - - - | - - - - - | - - - - - | - - - - - | - - - - - | - - - - - |
| 0.0587 | 43.38 | 0.5407 | 3.670 | 720 | 0.0715 | 44.52 | 0.5542 | 2.685 |
| 0.0678 | 46.00 | 0.5864 | 2.886 | 740 | 0.0793 | 46.52 | 0.5966 | 2.324 |
| 0.0766 | 48.27 | 0.6268 | 2.421 | 760 | 0.0867 | 48.30 | 0.6343 | 2.081 |
| 0.0847 | 50.27 | 0.6623 | 2.128 | 780 | 0.0937 | 49.93 | 0.6681 | 1.9106 |
| 0.0923 | 52.05 | 0.6939 | 1.9319 | 800 | 0.1003 | 51.43 | 0.6983 | 1.7852 |
| 0.1091 | 55.87 | 0.7590 | 1.6478 | 850 | 0.1155 | 54.81 | 0.7614 | 1.5839 |
| 0.1240 | 59.16 | 0.8093 | 1.4986 | 900 | 0.1292 | 57.83 | 0.8107 | 1.4662 |
| 0.1374 | 62.15 | 0.8488 | 1.4077 | 950 | 0.1419 | 60.63 | 0.8497 | 1.3895 |
| 0.1499 | 64.95 | 0.8803 | 1.3468 | 1000 | 0.1538 | 63.30 | 0.8809 | 1.3357 |
| | | | | | | | | |
| x = 0.20 | | | | | x = 0.40 | | | |
| V | H | φ ₁ | φ ₂ | T | V | H | φ ₁ | φ ₂ |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 640 | 0.0946 | 36.03 | 0.5129 | 1.6902 |
| 0.0705 | 39.45 | 0.4514 | 2.695 | 660 | 0.0996 | 37.12 | 0.5532 | 1.6213 |
| 0.0773 | 41.20 | 0.4997 | 2.365 | 680 | 0.1045 | 38.18 | 0.5906 | 1.5644 |
| 0.0839 | 42.81 | 0.5440 | 2.132 | 700 | 0.1092 | 39.20 | 0.6252 | 1.5167 |
| - - - - - | - - - - - | - - - - - | - - - - - | - - - - - | - - - - - | - - - - - | - - - - - | - - - - - |
| 0.0902 | 44.30 | 0.5844 | 1.9620 | 720 | 0.1139 | 40.20 | 0.6571 | 1.4763 |
| 0.0963 | 45.69 | 0.6211 | 1.8341 | 740 | 0.1185 | 41.17 | 0.6865 | 1.4416 |
| 0.1022 | 47.01 | 0.6545 | 1.7351 | 760 | 0.1230 | 42.13 | 0.7136 | 1.4116 |
| 0.1078 | 48.26 | 0.6848 | 1.6565 | 780 | 0.1274 | 43.07 | 0.7384 | 1.3854 |
| 0.1133 | 49.46 | 0.7123 | 1.5930 | 800 | 0.1318 | 43.99 | 0.7612 | 1.3623 |
| 0.1262 | 52.28 | 0.7709 | 1.4774 | 850 | 0.1424 | 46.25 | 0.8104 | 1.3152 |
| 0.1384 | 54.93 | 0.8174 | 1.4001 | 900 | 0.1527 | 48.46 | 0.8502 | 1.2790 |
| 0.1499 | 57.47 | 0.8547 | 1.3448 | 950 | 0.1627 | 50.63 | 0.8824 | 1.2504 |
| 0.1609 | 59.93 | 0.8848 | 1.3035 | 1000 | 0.1725 | 52.79 | 0.9087 | 1.2271 |
| | | | | | | | | |
| x = 0.60 | | | | | | | | |
| V | H | φ ₁ | φ ₂ | T | | | | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | | | | |
| 0.1038 | 29.21 | 0.5696 | 1.3860 | 600 | | | | |
| 0.1079 | 30.08 | 0.6080 | 1.3612 | 620 | | | | |
| 0.1120 | 30.93 | 0.6437 | 1.3394 | 640 | | | | |
| 0.1161 | 31.76 | 0.6765 | 1.3201 | 660 | | | | |
| 0.1201 | 32.59 | 0.7069 | 1.3030 | 680 | | | | |
| 0.1241 | 33.41 | 0.7347 | 1.2876 | 700 | | | | |
| - - - - - | - - - - - | - - - - - | - - - - - | - - - - - | | | | |
| 0.1280 | 34.21 | 0.7603 | 1.2737 | 720 | | | | |
| 0.1319 | 35.01 | 0.7838 | 1.2611 | 740 | | | | |
| 0.1358 | 35.81 | 0.8053 | 1.2497 | 760 | | | | |
| 0.1396 | 36.60 | 0.8250 | 1.2392 | 780 | | | | |
| 0.1434 | 37.39 | 0.8431 | 1.2296 | 800 | | | | |
| 0.1528 | 39.34 | 0.8818 | 1.2086 | 850 | | | | |
| 0.1620 | 41.29 | 0.9132 | 1.1911 | 900 | | | | |
| 0.1711 | 43.23 | 0.9385 | 1.1761 | 950 | | | | |
| 0.1801 | 45.17 | 0.9590 | 1.1633 | 1000 | | | | |

P = 60 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 0.0335 | 33.76 | 0.3317 | 12.317 | 660 | | | | |
| 0.0370 | 36.12 | 0.3817 | 9.041 | 680 | 0.0458 | 38.10 | 0.3979 | 5.396 |
| 0.0414 | 38.63 | 0.4321 | 6.636 | 700 | 0.0514 | 40.42 | 0.4480 | 4.220 |
| ----- | | | | | | | | |
| 0.0470 | 41.21 | 0.4814 | 4.958 | 720 | 0.0573 | 42.64 | 0.4958 | 3.427 |
| 0.0533 | 43.73 | 0.5281 | 3.845 | 740 | 0.0634 | 44.70 | 0.5401 | 2.894 |
| 0.0599 | 46.08 | 0.5711 | 3.125 | 760 | 0.0694 | 46.59 | 0.5808 | 2.527 |
| 0.0664 | 48.22 | 0.6101 | 2.655 | 780 | 0.0752 | 48.34 | 0.6178 | 2.268 |
| 0.0728 | 50.16 | 0.6453 | 2.338 | 800 | 0.0807 | 49.95 | 0.6514 | 2.079 |
| 0.0874 | 54.35 | 0.7191 | 1.8912 | 850 | 0.0938 | 53.58 | 0.7226 | 1.7806 |
| 0.1003 | 57.91 | 0.7769 | 1.6662 | 900 | 0.1056 | 56.79 | 0.7790 | 1.6111 |
| 0.1121 | 61.09 | 0.8227 | 1.5340 | 950 | 0.1166 | 59.75 | 0.8241 | 1.5033 |
| 0.1230 | 64.04 | 0.8594 | 1.4478 | 1000 | 0.1270 | 62.54 | 0.8603 | 1.4292 |
| ----- | | | | | | | | |
| x = 0.20 | | | | | x = 0.40 | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 660 | 0.0844 | 36.56 | 0.5054 | 1.7855 |
| 0.0638 | 39.87 | 0.4434 | 2.8454 | 680 | 0.0884 | 37.65 | 0.5444 | 1.7124 |
| 0.0690 | 41.53 | 0.4887 | 2.5251 | 700 | 0.0924 | 38.70 | 0.5809 | 1.6510 |
| ----- | | | | | | | | |
| 0.0742 | 43.09 | 0.5309 | 2.2887 | 720 | 0.0963 | 39.73 | 0.6150 | 1.5990 |
| 0.0792 | 44.55 | 0.5700 | 2.1099 | 740 | 0.1001 | 40.73 | 0.6467 | 1.5545 |
| 0.0841 | 45.93 | 0.6060 | 1.9716 | 760 | 0.1038 | 41.71 | 0.6761 | 1.5159 |
| 0.0888 | 47.25 | 0.6391 | 1.8623 | 780 | 0.1075 | 42.67 | 0.7033 | 1.4822 |
| 0.0934 | 48.51 | 0.6695 | 1.7742 | 800 | 0.1112 | 43.62 | 0.7285 | 1.4526 |
| 0.1044 | 51.47 | 0.7351 | 1.6155 | 850 | 0.1201 | 45.93 | 0.7833 | 1.3922 |
| 0.1148 | 54.23 | 0.7880 | 1.5106 | 900 | 0.1288 | 48.19 | 0.8282 | 1.3460 |
| 0.1247 | 56.86 | 0.8308 | 1.4366 | 950 | 0.1372 | 50.40 | 0.8650 | 1.3095 |
| 0.1341 | 59.39 | 0.8656 | 1.3819 | 1000 | 0.1455 | 52.59 | 0.8951 | 1.2801 |
| ----- | | | | | | | | |
| x = 0.60 | | | | | | | | |
| V | H | ϕ_1 | ϕ_2 | T | | | | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | | | | |
| 0.0928 | 29.91 | 0.5703 | 1.4478 | 620 | | | | |
| 0.0962 | 30.78 | 0.6079 | 1.4204 | 640 | | | | |
| 0.0996 | 31.63 | 0.6429 | 1.3962 | 660 | | | | |
| 0.1029 | 32.46 | 0.6754 | 1.3746 | 680 | | | | |
| 0.1062 | 33.29 | 0.7055 | 1.3552 | 700 | | | | |
| ----- | | | | | | | | |
| 0.1094 | 34.11 | 0.7334 | 1.3378 | 720 | | | | |
| 0.1127 | 34.92 | 0.7591 | 1.3219 | 740 | | | | |
| 0.1159 | 35.73 | 0.7828 | 1.3075 | 760 | | | | |
| 0.1191 | 36.53 | 0.8047 | 1.2943 | 780 | | | | |
| 0.1222 | 37.33 | 0.8248 | 1.2822 | 800 | | | | |
| 0.1300 | 39.31 | 0.8683 | 1.2558 | 850 | | | | |
| 0.1378 | 41.27 | 0.9037 | 1.2339 | 900 | | | | |
| 0.1454 | 43.23 | 0.9325 | 1.2153 | 950 | | | | |
| 0.1529 | 45.18 | 0.9558 | 1.1994 | 1000 | | | | |

P = 70 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 0.0295 | 31.18 | 0.2550 | 17.818 | 640 | | | | |
| 0.0315 | 33.22 | 0.2986 | 13.642 | 660 | | | | |
| 0.0341 | 35.35 | 0.3441 | 10.408 | 680 | 0.0408 | 37.03 | 0.3575 | 6.4859 |
| 0.0372 | 37.57 | 0.3906 | 7.950 | 700 | 0.0448 | 39.18 | 0.4045 | 5.1508 |
| ----- | | | | | | | | |
| 0.0410 | 39.87 | 0.4371 | 6.128 | 720 | 0.0491 | 41.28 | 0.4506 | 4.1935 |
| 0.0454 | 42.17 | 0.4825 | 4.818 | 740 | 0.0538 | 43.30 | 0.4948 | 3.5124 |
| 0.0502 | 44.43 | 0.5256 | 3.899 | 760 | 0.0585 | 45.21 | 0.5364 | 3.0262 |
| 0.0553 | 46.57 | 0.5660 | 3.262 | 780 | 0.0633 | 47.00 | 0.5750 | 2.6744 |
| 0.0604 | 48.57 | 0.6033 | 2.817 | 800 | 0.0679 | 48.68 | 0.6108 | 2.4148 |
| 0.0728 | 52.98 | 0.6833 | 2.178 | 850 | 0.0791 | 52.47 | 0.6879 | 2.0046 |
| 0.0841 | 56.74 | 0.7472 | 1.8600 | 900 | 0.0894 | 55.84 | 0.7500 | 1.7740 |
| 0.0945 | 60.10 | 0.7984 | 1.6773 | 950 | 0.0991 | 58.93 | 0.8003 | 1.6296 |
| 0.1042 | 63.19 | 0.8398 | 1.5605 | 1000 | 0.1081 | 61.82 | 0.8411 | 1.5317 |

| x = 0.20 | | | | | x = 0.30 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 660 | 0.0741 | 36.12 | 0.4672 | 1.9579 |
| 0.0554 | 38.87 | 0.4004 | 3.344 | 680 | 0.0775 | 37.23 | 0.5069 | 1.8680 |
| 0.0596 | 40.53 | 0.4450 | 2.943 | 700 | 0.0809 | 38.30 | 0.5446 | 1.7925 |
| ----- | | | | | | | | |
| 0.0638 | 42.11 | 0.4875 | 2.641 | 720 | 0.0842 | 39.35 | 0.5800 | 1.7284 |
| 0.0679 | 43.60 | 0.5276 | 2.410 | 740 | 0.0874 | 40.37 | 0.6133 | 1.6734 |
| 0.0720 | 45.03 | 0.5651 | 2.230 | 760 | 0.0906 | 41.37 | 0.6444 | 1.6257 |
| 0.0761 | 46.38 | 0.6000 | 2.088 | 780 | 0.0938 | 42.35 | 0.6734 | 1.5842 |
| 0.0800 | 47.69 | 0.6324 | 1.9727 | 800 | 0.0969 | 43.31 | 0.7003 | 1.5476 |
| 0.0895 | 50.75 | 0.7033 | 1.7661 | 850 | 0.1046 | 45.67 | 0.7597 | 1.4731 |
| 0.0985 | 53.60 | 0.7613 | 1.6305 | 900 | 0.1120 | 47.96 | 0.8089 | 1.4162 |
| 0.1070 | 56.30 | 0.8088 | 1.5355 | 950 | 0.1193 | 50.21 | 0.8495 | 1.3714 |
| 0.1153 | 58.91 | 0.8478 | 1.4657 | 1000 | 0.1264 | 52.43 | 0.8831 | 1.3352 |

| x = 0.60 | | | | |
|-----------------------------------|----------------------|----------|----------|------|
| V | H | ϕ_1 | ϕ_2 | T |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K |
| 0.0852 | 30.69 | 0.5792 | 1.5059 | 640 |
| 0.0880 | 31.55 | 0.6157 | 1.4764 | 660 |
| 0.0909 | 32.39 | 0.6499 | 1.4500 | 680 |
| 0.0937 | 33.23 | 0.6817 | 1.4264 | 700 |
| ----- | | | | |
| 0.0964 | 34.06 | 0.7113 | 1.4051 | 720 |
| 0.0992 | 34.88 | 0.7388 | 1.3858 | 740 |
| 0.1019 | 35.70 | 0.7642 | 1.3682 | 760 |
| 0.1046 | 36.50 | 0.7878 | 1.3522 | 780 |
| 0.1073 | 37.31 | 0.8096 | 1.3374 | 800 |
| 0.1140 | 39.30 | 0.8571 | 1.3053 | 850 |
| 0.1206 | 41.28 | 0.8959 | 1.2786 | 900 |
| 0.1271 | 43.25 | 0.9282 | 1.2557 | 950 |
| 0.1336 | 45.22 | 0.9542 | 1.2363 | 1000 |

P = 80 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 0.0285 | 30.93 | 0.2339 | 18.958 | 640 | | | | |
| 0.0302 | 32.85 | 0.2740 | 14.826 | 660 | | | | |
| 0.0322 | 34.83 | 0.3162 | 11.591 | 680 | 0.0376 | 36.32 | 0.3276 | 7.472 |
| 0.0346 | 36.88 | 0.3596 | 9.086 | 700 | 0.0407 | 38.32 | 0.3717 | 6.023 |
| ----- | | | | | | | | |
| 0.0374 | 38.99 | 0.4035 | 7.173 | 720 | 0.0440 | 40.31 | 0.4157 | 4.943 |
| 0.0407 | 41.12 | 0.4470 | 5.736 | 740 | 0.0476 | 42.25 | 0.4587 | 4.144 |
| 0.0443 | 43.24 | 0.4893 | 4.676 | 760 | 0.0514 | 44.13 | 0.5001 | 3.553 |
| 0.0483 | 45.30 | 0.5297 | 3.902 | 780 | 0.0553 | 45.92 | 0.5393 | 3.113 |
| 0.0524 | 47.28 | 0.5678 | 3.341 | 800 | 0.0592 | 47.62 | 0.5761 | 2.783 |
| 0.0627 | 51.78 | 0.6517 | 2.503 | 850 | 0.0687 | 51.51 | 0.6572 | 2.253 |
| 0.0726 | 55.69 | 0.7203 | 2.079 | 900 | 0.0778 | 54.99 | 0.7239 | 1.954 |
| 0.0818 | 59.19 | 0.7761 | 1.838 | 950 | 0.0863 | 58.18 | 0.7786 | 1.768 |
| 0.0904 | 62.39 | 0.8217 | 1.685 | 1000 | 0.0944 | 61.17 | 0.8234 | 1.643 |

| x = 0.20 | | | | | x = 0.40 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| | | | | 660 | 0.0667 | 35.78 | 0.4365 | 2.138 |
| 0.0498 | 38.11 | 0.3673 | 3.851 | 680 | 0.0697 | 36.90 | 0.4765 | 2.031 |
| 0.0532 | 39.75 | 0.4106 | 3.375 | 700 | 0.0726 | 37.99 | 0.5147 | 1.941 |
| ----- | | | | | | | | |
| 0.0567 | 41.33 | 0.4526 | 3.011 | 720 | 0.0754 | 39.05 | 0.5510 | 1.864 |
| 0.0602 | 42.83 | 0.4927 | 2.730 | 740 | 0.0782 | 40.08 | 0.5853 | 1.798 |
| 0.0637 | 44.28 | 0.5309 | 2.508 | 760 | 0.0810 | 41.09 | 0.6175 | 1.741 |
| 0.0671 | 45.66 | 0.5668 | 2.330 | 780 | 0.0838 | 42.09 | 0.6479 | 1.691 |
| 0.0705 | 46.99 | 0.6005 | 2.187 | 800 | 0.0865 | 43.07 | 0.6762 | 1.647 |
| 0.0787 | 50.12 | 0.6753 | 1.928 | 850 | 0.0932 | 45.46 | 0.7392 | 1.558 |
| 0.0866 | 53.04 | 0.7374 | 1.759 | 900 | 0.0997 | 47.78 | 0.7919 | 1.490 |
| 0.0941 | 55.81 | 0.7889 | 1.641 | 950 | 0.1060 | 50.05 | 0.8359 | 1.436 |
| 0.1014 | 58.47 | 0.8316 | 1.555 | 1000 | 0.1123 | 52.30 | 0.8725 | 1.393 |

| x = 0.60 | | | | |
|-----------------------------------|----------------------|----------|----------|------|
| V | H | ϕ_1 | ϕ_2 | T |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K |
| 0.0771 | 30.64 | 0.5565 | 1.595 | 640 |
| 0.0796 | 31.51 | 0.5941 | 1.560 | 660 |
| 0.0820 | 32.37 | 0.6295 | 1.529 | 680 |
| 0.0845 | 33.21 | 0.6627 | 1.501 | 700 |
| ----- | | | | |
| 0.0869 | 34.05 | 0.6937 | 1.475 | 720 |
| 0.0893 | 34.88 | 0.7226 | 1.452 | 740 |
| 0.0916 | 35.70 | 0.7495 | 1.431 | 760 |
| 0.0940 | 36.51 | 0.7745 | 1.412 | 780 |
| 0.0963 | 37.32 | 0.7977 | 1.395 | 800 |
| 0.1022 | 39.33 | 0.8485 | 1.356 | 850 |
| 0.1079 | 41.32 | 0.8904 | 1.325 | 900 |
| 0.1136 | 43.30 | 0.9249 | 1.298 | 950 |
| 0.1192 | 45.29 | 0.9534 | 1.275 | 1000 |

P = 90 MPa

| x = 0.05 | | | | | x = 0.10 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 0.0277 | 30.74 | 0.218 | 20.101 | 640 | | | | |
| 0.0292 | 32.58 | 0.255 | 15.960 | 660 | | | | |
| 0.0308 | 34.47 | 0.295 | 12.690 | 680 | 0.0354 | 35.81 | 0.3048 | 8.396 |
| 0.0328 | 36.40 | 0.336 | 10.127 | 700 | 0.0379 | 37.71 | 0.3464 | 6.852 |
| ----- | | | | | | | | |
| 0.0351 | 38.38 | 0.377 | 8.134 | 720 | 0.0406 | 39.60 | 0.3884 | 5.671 |
| 0.0376 | 40.37 | 0.419 | 6.600 | 740 | 0.0435 | 41.47 | 0.4301 | 4.773 |
| 0.0405 | 42.38 | 0.460 | 5.431 | 760 | 0.0466 | 43.29 | 0.4707 | 4.091 |
| 0.0436 | 44.35 | 0.500 | 4.549 | 780 | 0.0498 | 45.05 | 0.5097 | 3.572 |
| 0.0469 | 46.28 | 0.538 | 3.886 | 800 | 0.0530 | 46.75 | 0.5469 | 3.174 |
| 0.0556 | 50.77 | 0.624 | 2.857 | 850 | 0.0612 | 50.68 | 0.6304 | 2.522 |
| 0.0641 | 54.77 | 0.696 | 2.321 | 900 | 0.0691 | 54.24 | 0.7006 | 2.150 |
| 0.0723 | 58.36 | 0.756 | 2.014 | 950 | 0.0767 | 57.51 | 0.7589 | 1.919 |
| 0.0800 | 61.66 | 0.805 | 1.822 | 1000 | 0.0839 | 60.57 | 0.8071 | 1.764 |

| x = 0.20 | | | | | x = 0.40 | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | |
| 0.0458 | 37.54 | 0.341 | 4.361 | 680 | 0.0638 | 36.64 | 0.4515 | 2.202 |
| 0.0487 | 39.15 | 0.383 | 3.816 | 700 | 0.0663 | 37.74 | 0.4900 | 2.096 |
| ----- | | | | | | | | |
| 0.0516 | 40.71 | 0.424 | 3.393 | 720 | 0.0688 | 38.81 | 0.5267 | 2.006 |
| 0.0546 | 42.21 | 0.464 | 3.063 | 740 | 0.0713 | 39.86 | 0.5617 | 1.929 |
| 0.0576 | 43.66 | 0.502 | 2.799 | 760 | 0.0737 | 40.88 | 0.5949 | 1.862 |
| 0.0605 | 45.06 | 0.539 | 2.587 | 780 | 0.0762 | 41.89 | 0.6262 | 1.803 |
| 0.0635 | 46.40 | 0.573 | 2.414 | 800 | 0.0786 | 42.88 | 0.6557 | 1.752 |
| 0.0707 | 49.58 | 0.651 | 2.102 | 850 | 0.0845 | 45.29 | 0.7215 | 1.646 |
| 0.0776 | 52.56 | 0.716 | 1.897 | 900 | 0.0902 | 47.63 | 0.7772 | 1.566 |
| 0.0843 | 55.37 | 0.771 | 1.754 | 950 | 0.0959 | 49.93 | 0.8240 | 1.503 |
| 0.0908 | 58.08 | 0.817 | 1.650 | 1000 | 0.1014 | 52.20 | 0.8633 | 1.452 |

| x = 0.60 | | | | |
|-----------------------------------|----------------------|----------|----------|------|
| V | H | ϕ_1 | ϕ_2 | T |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K |
| | | | | 600 |
| | | | | 620 |
| | | | | 640 |
| 0.0731 | 31.51 | 0.577 | 1.648 | 660 |
| 0.0753 | 32.37 | 0.613 | 1.612 | 680 |
| 0.0774 | 33.23 | 0.647 | 1.579 | 700 |
| ----- | | | | |
| 0.0796 | 34.07 | 0.680 | 1.549 | 720 |
| 0.0817 | 34.90 | 0.710 | 1.522 | 740 |
| 0.0838 | 35.73 | 0.738 | 1.497 | 760 |
| 0.0858 | 36.55 | 0.764 | 1.475 | 780 |
| 0.0879 | 37.36 | 0.789 | 1.454 | 800 |
| 0.0930 | 39.38 | 0.842 | 1.410 | 850 |
| 0.0981 | 41.38 | 0.887 | 1.372 | 900 |
| 0.1031 | 43.38 | 0.924 | 1.341 | 950 |
| 0.1081 | 45.37 | 0.954 | 1.315 | 1000 |

P = 100 MPa

| x = 0.05 | | | | | x = 0.10 | | | | |
|-----------------------------------|----------------------|----------|----------|------|-----------------------------------|----------------------|----------|----------|--|
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| 0.0270 | 30.61 | 0.205 | 21.277 | 640 | | | | | |
| 0.0283 | 32.39 | 0.241 | 17.086 | 660 | | | | | |
| 0.0298 | 34.20 | 0.278 | 13.756 | 680 | 0.0338 | 35.43 | 0.2869 | 9.291 | |
| 0.0314 | 36.05 | 0.317 | 11.121 | 700 | 0.0358 | 37.26 | 0.3265 | 7.655 | |
| ----- | | | | | ----- | | | | |
| 0.0333 | 37.93 | 0.357 | 9.048 | 720 | 0.0381 | 39.07 | 0.3668 | 6.384 | |
| 0.0354 | 39.83 | 0.397 | 7.426 | 740 | 0.0405 | 40.87 | 0.4070 | 5.399 | |
| 0.0378 | 41.74 | 0.437 | 6.166 | 760 | 0.0431 | 42.64 | 0.4467 | 4.635 | |
| 0.0403 | 43.63 | 0.476 | 5.191 | 780 | 0.0458 | 44.37 | 0.4853 | 4.043 | |
| 0.0431 | 45.49 | 0.513 | 4.441 | 800 | 0.0485 | 46.04 | 0.5224 | 3.581 | |
| 0.0503 | 49.93 | 0.600 | 3.234 | 850 | 0.0556 | 49.98 | 0.6073 | 2.809 | |
| 0.0578 | 53.96 | 0.675 | 2.584 | 900 | 0.0626 | 53.58 | 0.6800 | 2.361 | |
| 0.0650 | 57.62 | 0.738 | 2.206 | 950 | 0.0693 | 56.91 | 0.7412 | 2.081 | |
| 0.0720 | 60.99 | 0.790 | 1.970 | 1000 | 0.0758 | 60.03 | 0.7924 | 1.893 | |
| ----- | | | | | ----- | | | | |
| x = 0.20 | | | | | x = 0.40 | | | | |
| V | H | ϕ_1 | ϕ_2 | T | V | H | ϕ_1 | ϕ_2 | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | |
| | | | | 680 | 0.0592 | 36.44 | 0.4310 | 2.380 | |
| 0.0453 | 38.68 | 0.361 | 4.267 | 700 | 0.0614 | 37.55 | 0.4694 | 2.259 | |
| ----- | | | | | ----- | | | | |
| 0.0478 | 40.22 | 0.401 | 3.787 | 720 | 0.0637 | 38.62 | 0.5065 | 2.155 | |
| 0.0504 | 41.71 | 0.441 | 3.407 | 740 | 0.0659 | 39.68 | 0.5420 | 2.066 | |
| 0.0530 | 43.16 | 0.479 | 3.102 | 760 | 0.0681 | 40.71 | 0.5758 | 1.988 | |
| 0.0556 | 44.56 | 0.515 | 2.855 | 780 | 0.0702 | 41.73 | 0.6078 | 1.920 | |
| 0.0581 | 45.91 | 0.550 | 2.653 | 800 | 0.0724 | 42.73 | 0.6381 | 1.861 | |
| 0.0645 | 49.12 | 0.629 | 2.285 | 850 | 0.0776 | 45.16 | 0.7064 | 1.739 | |
| 0.0707 | 52.14 | 0.697 | 2.043 | 900 | 0.0828 | 47.53 | 0.7646 | 1.646 | |
| 0.0767 | 54.99 | 0.755 | 1.874 | 950 | 0.0879 | 49.84 | 0.8139 | 1.573 | |
| 0.0825 | 57.74 | 0.804 | 1.751 | 1000 | 0.0928 | 52.13 | 0.8554 | 1.515 | |
| ----- | | | | | ----- | | | | |
| x = 0.60 | | | | | | | | | |
| V | H | ϕ_1 | ϕ_2 | T | | | | | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | | | K | | | | | |
| 0.0680 | 31.54 | 0.560 | 1.747 | 660 | | | | | |
| 0.0700 | 32.41 | 0.597 | 1.704 | 680 | | | | | |
| 0.0719 | 33.27 | 0.632 | 1.666 | 700 | | | | | |
| ----- | | | | | | | | | |
| 0.0738 | 34.11 | 0.665 | 1.631 | 720 | | | | | |
| 0.0757 | 34.95 | 0.700 | 1.594 | 740 | | | | | |
| 0.0775 | 35.78 | 0.729 | 1.566 | 760 | | | | | |
| 0.0794 | 36.61 | 0.756 | 1.540 | 780 | | | | | |
| 0.0812 | 37.43 | 0.782 | 1.516 | 800 | | | | | |
| 0.0858 | 39.45 | 0.838 | 1.465 | 850 | | | | | |
| 0.0904 | 41.47 | 0.885 | 1.422 | 900 | | | | | |
| 0.0948 | 43.47 | 0.924 | 1.386 | 950 | | | | | |
| 0.0993 | 45.46 | 0.956 | 1.356 | 1000 | | | | | |

Table 5

Infinite-dilution (standard state) values of
partial molar volume V_2 , enthalpy H_2 , and heat capacity C_{p2} ,
and fugacity coefficient ϕ_2 of nitrogen in water,
for the same pressures and temperatures as in Table 4.
Values in italics refer to the liquid state.

| P = 0.05 MPa | | | | | P = 0.10 MPa | | | | |
|-----------------------------------|----------------------|--------------------------------------|----------------|------|-----------------------------------|----------------------|--------------------------------------|----------------|--|
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 73.6 | 10.57 | 0.028 | 1.0056 | 440 | 37.0 | 10.70 | 0.026 | 1.0114 | |
| 76.8 | 11.13 | 0.028 | 1.0043 | 460 | 38.6 | 11.23 | 0.027 | 1.0087 | |
| 80.1 | 11.70 | 0.029 | 1.0034 | 480 | 40.2 | 11.78 | 0.028 | 1.0069 | |
| 83.4 | 12.28 | 0.029 | 1.0027 | 500 | 41.8 | 12.34 | 0.028 | 1.0055 | |
| 86.7 | 12.86 | 0.029 | 1.0022 | 520 | 43.4 | 12.91 | 0.029 | 1.0044 | |
| 90.0 | 13.45 | 0.029 | 1.0018 | 540 | 45.1 | 13.49 | 0.029 | 1.0036 | |
| 93.3 | 14.04 | 0.030 | 1.0015 | 560 | 46.7 | 14.07 | 0.029 | 1.0030 | |
| 96.6 | 14.63 | 0.030 | 1.0012 | 580 | 48.4 | 14.66 | 0.030 | 1.0026 | |
| 99.9 | 15.23 | 0.030 | 1.0011 | 600 | 50.0 | 15.25 | 0.030 | 1.0022 | |
| 103.2 | 15.83 | 0.030 | 1.0009 | 620 | 51.6 | 15.85 | 0.030 | 1.0019 | |
| 106.5 | 16.43 | 0.030 | 1.0008 | 640 | 53.3 | 16.45 | 0.030 | 1.0016 | |
| 109.8 | 17.04 | 0.030 | 1.0007 | 660 | 54.9 | 17.06 | 0.030 | 1.0014 | |
| 113.1 | 17.65 | 0.030 | 1.0006 | 680 | 56.6 | 17.66 | 0.030 | 1.0012 | |
| 116.5 | 18.26 | 0.031 | 1.0005 | 700 | 58.3 | 18.27 | 0.031 | 1.0011 | |
| 119.8 | 18.88 | 0.031 | 1.0005 | 720 | 59.9 | 18.89 | 0.031 | 1.0010 | |
| 123.1 | 19.49 | 0.031 | 1.0004 | 740 | 61.6 | 19.50 | 0.031 | 1.0009 | |
| 126.4 | 20.11 | 0.031 | 1.0004 | 760 | 63.2 | 20.12 | 0.031 | 1.0008 | |
| 129.8 | 20.74 | 0.031 | 1.0003 | 780 | 64.9 | 20.75 | 0.031 | 1.0007 | |
| 133.1 | 21.36 | 0.031 | 1.0003 | 800 | 66.6 | 21.37 | 0.031 | 1.0007 | |
| 141.4 | 22.94 | 0.032 | 1.0003 | 850 | 70.7 | 22.95 | 0.032 | 1.0006 | |
| 149.7 | 24.53 | 0.032 | 1.0002 | 900 | 74.9 | 24.54 | 0.032 | 1.0005 | |
| 158.0 | 26.15 | 0.032 | 1.0002 | 950 | 79.0 | 26.15 | 0.032 | 1.0004 | |
| 166.3 | 27.78 | 0.033 | 1.0002 | 1000 | 83.2 | 27.78 | 0.033 | 1.0004 | |

| P = 0.15 MPa | | | | | P = 0.20 MPa | | | | |
|-----------------------------------|----------------------|--------------------------------------|----------------|------|-----------------------------------|----------------------|--------------------------------------|----------------|--|
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 24.81 | 10.83 | 0.024 | 1.0174 | 440 | 18.73 | 10.97 | 0.022 | 1.0236 | |
| 25.85 | 11.33 | 0.026 | 1.0133 | 460 | 19.48 | 11.44 | 0.024 | 1.0180 | |
| 26.89 | 11.86 | 0.027 | 1.0104 | 480 | 20.24 | 11.94 | 0.026 | 1.0140 | |
| 27.95 | 12.40 | 0.028 | 1.0083 | 500 | 21.02 | 12.47 | 0.027 | 1.0112 | |
| 29.02 | 12.96 | 0.028 | 1.0067 | 520 | 21.82 | 13.01 | 0.028 | 1.0090 | |
| 30.10 | 13.53 | 0.029 | 1.0055 | 540 | 22.62 | 13.57 | 0.028 | 1.0074 | |
| 31.1 | 14.11 | 0.029 | 1.0046 | 560 | 23.43 | 14.14 | 0.029 | 1.0062 | |
| 32.3 | 14.69 | 0.029 | 1.0039 | 580 | 24.24 | 14.72 | 0.029 | 1.0052 | |
| 33.4 | 15.28 | 0.030 | 1.0033 | 600 | 25.05 | 15.31 | 0.029 | 1.0044 | |
| 34.5 | 15.87 | 0.030 | 1.0028 | 620 | 25.87 | 15.90 | 0.030 | 1.0038 | |
| 35.6 | 16.47 | 0.030 | 1.0025 | 640 | 26.69 | 16.49 | 0.030 | 1.0033 | |
| 36.7 | 17.07 | 0.030 | 1.0022 | 660 | 27.52 | 17.09 | 0.030 | 1.0029 | |
| 37.8 | 17.68 | 0.030 | 1.0019 | 680 | 28.34 | 17.69 | 0.030 | 1.0026 | |
| 38.9 | 18.29 | 0.030 | 1.0017 | 700 | 29.17 | 18.30 | 0.030 | 1.0023 | |
| 40.0 | 18.90 | 0.031 | 1.0015 | 720 | 29.99 | 18.91 | 0.031 | 1.0020 | |
| 41.1 | 19.51 | 0.031 | 1.0014 | 740 | 30.8 | 19.53 | 0.031 | 1.0018 | |
| 42.2 | 20.13 | 0.031 | 1.0012 | 760 | 31.6 | 20.14 | 0.031 | 1.0017 | |
| 43.3 | 20.75 | 0.031 | 1.0011 | 780 | 32.5 | 20.76 | 0.031 | 1.0015 | |
| 44.4 | 21.38 | 0.031 | 1.0010 | 800 | 33.3 | 21.39 | 0.031 | 1.0014 | |
| 47.2 | 22.95 | 0.032 | 1.0009 | 850 | 35.4 | 22.96 | 0.032 | 1.0012 | |
| 49.9 | 24.54 | 0.032 | 1.0008 | 900 | 37.4 | 24.55 | 0.032 | 1.0010 | |
| 52.7 | 26.15 | 0.032 | 1.0007 | 950 | 39.5 | 26.16 | 0.032 | 1.0009 | |
| 55.5 | 27.78 | 0.033 | 1.0006 | 1000 | 41.6 | 27.79 | 0.033 | 1.0008 | |

| P = 0.25 MPa | | | | | P = 0.30 MPa | | | | |
|-----------------------------------|----------------------|--------------------------------------|----------------|------|-----------------------------------|----------------------|--------------------------------------|----------------|--|
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 15.08 | 11.12 | 0.020 | 1.0300 | 440 | 12.66 | 11.27 | 0.018 | 1.0366 | |
| 15.66 | 11.55 | 0.023 | 1.0228 | 460 | 13.12 | 11.66 | 0.021 | 1.0278 | |
| 16.26 | 12.03 | 0.025 | 1.0178 | 480 | 13.60 | 12.12 | 0.024 | 1.0216 | |
| 16.87 | 12.54 | 0.026 | 1.0141 | 500 | 14.10 | 12.61 | 0.025 | 1.0171 | |
| 17.50 | 13.07 | 0.027 | 1.0114 | 520 | 14.62 | 13.13 | 0.027 | 1.0138 | |
| 18.13 | 13.62 | 0.028 | 1.0093 | 540 | 15.14 | 13.66 | 0.027 | 1.0113 | |
| 18.77 | 14.18 | 0.028 | 1.0078 | 560 | 15.67 | 14.22 | 0.028 | 1.0094 | |
| 19.42 | 14.75 | 0.029 | 1.0065 | 580 | 16.20 | 14.78 | 0.029 | 1.0079 | |
| 20.07 | 15.33 | 0.029 | 1.0056 | 600 | 16.74 | 15.36 | 0.029 | 1.0067 | |
| 20.72 | 15.92 | 0.029 | 1.0048 | 620 | 17.28 | 15.94 | 0.029 | 1.0058 | |
| 21.37 | 16.51 | 0.030 | 1.0041 | 640 | 17.83 | 16.53 | 0.030 | 1.0050 | |
| 22.03 | 17.11 | 0.030 | 1.0036 | 660 | 18.37 | 17.12 | 0.030 | 1.0044 | |
| 22.69 | 17.71 | 0.030 | 1.0032 | 680 | 18.92 | 17.72 | 0.030 | 1.0039 | |
| 23.35 | 18.31 | 0.030 | 1.0029 | 700 | 19.47 | 18.33 | 0.030 | 1.0034 | |
| 24.01 | 18.92 | 0.031 | 1.0026 | 720 | 20.02 | 18.93 | 0.030 | 1.0031 | |
| 24.67 | 19.54 | 0.031 | 1.0023 | 740 | 20.57 | 19.55 | 0.031 | 1.0028 | |
| 25.33 | 20.15 | 0.031 | 1.0021 | 760 | 21.12 | 20.16 | 0.031 | 1.0025 | |
| 25.99 | 20.77 | 0.031 | 1.0019 | 780 | 21.67 | 20.78 | 0.031 | 1.0023 | |
| 26.65 | 21.39 | 0.031 | 1.0018 | 800 | 22.22 | 21.40 | 0.031 | 1.0022 | |
| 28.31 | 22.96 | 0.032 | 1.0015 | 850 | 23.60 | 22.97 | 0.032 | 1.0018 | |
| 29.97 | 24.55 | 0.032 | 1.0013 | 900 | 24.98 | 24.56 | 0.032 | 1.0016 | |
| 31.63 | 26.16 | 0.032 | 1.0011 | 950 | 26.37 | 26.17 | 0.032 | 1.0014 | |
| 33.29 | 27.79 | 0.033 | 1.0010 | 1000 | 27.75 | 27.79 | 0.033 | 1.0012 | |

| P = 0.40 MPa | | | | | P = 0.50 MPa | | | | |
|-----------------------------------|----------------------|--------------------------------------|----------------|------|-----------------------------------|----------------------|--------------------------------------|----------------|--|
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 9.64 | 11.60 | 0.012 | 1.0505 | 440 | 7.84 | 11.96 | 0.006 | 1.0654 | |
| 9.95 | 11.91 | 0.018 | 1.0380 | 460 | 8.06 | 12.17 | 0.014 | 1.0489 | |
| 10.29 | 12.30 | 0.021 | 1.0294 | 480 | 8.30 | 12.50 | 0.019 | 1.0375 | |
| 10.64 | 12.75 | 0.024 | 1.0232 | 500 | 8.57 | 12.90 | 0.022 | 1.0295 | |
| 11.02 | 13.24 | 0.025 | 1.0186 | 520 | 8.86 | 13.36 | 0.024 | 1.0236 | |
| 11.40 | 13.76 | 0.026 | 1.0152 | 540 | 9.16 | 13.86 | 0.025 | 1.0192 | |
| 11.79 | 14.30 | 0.027 | 1.0126 | 560 | 9.46 | 14.38 | 0.027 | 1.0159 | |
| 12.19 | 14.85 | 0.028 | 1.0106 | 580 | 9.78 | 14.91 | 0.027 | 1.0133 | |
| 12.58 | 15.41 | 0.028 | 1.0090 | 600 | 10.09 | 15.47 | 0.028 | 1.0113 | |
| 12.99 | 15.99 | 0.029 | 1.0077 | 620 | 10.41 | 16.04 | 0.029 | 1.0097 | |
| 13.39 | 16.57 | 0.029 | 1.0067 | 640 | 10.73 | 16.61 | 0.029 | 1.0084 | |
| 13.80 | 17.16 | 0.030 | 1.0059 | 660 | 11.06 | 17.19 | 0.029 | 1.0074 | |
| 14.21 | 17.75 | 0.030 | 1.0052 | 680 | 11.38 | 17.78 | 0.030 | 1.0065 | |
| 14.62 | 18.35 | 0.030 | 1.0046 | 700 | 11.71 | 18.38 | 0.030 | 1.0058 | |
| 15.03 | 18.96 | 0.030 | 1.0041 | 720 | 12.04 | 18.98 | 0.030 | 1.0052 | |
| 15.44 | 19.57 | 0.031 | 1.0038 | 740 | 12.36 | 19.59 | 0.030 | 1.0047 | |
| 15.85 | 20.18 | 0.031 | 1.0034 | 760 | 12.69 | 20.20 | 0.031 | 1.0043 | |
| 16.26 | 20.80 | 0.031 | 1.0031 | 780 | 13.02 | 20.81 | 0.031 | 1.0039 | |
| 16.68 | 21.42 | 0.031 | 1.0029 | 800 | 13.35 | 21.43 | 0.031 | 1.0036 | |
| 17.11 | 22.08 | 0.032 | 1.0024 | 850 | 14.18 | 22.99 | 0.031 | 1.0030 | |
| 18.75 | 24.57 | 0.032 | 1.0021 | 900 | 15.01 | 24.58 | 0.032 | 1.0026 | |
| 19.78 | 26.17 | 0.032 | 1.0018 | 950 | 15.83 | 26.18 | 0.032 | 1.0023 | |
| 20.82 | 27.80 | 0.033 | 1.0017 | 1000 | 16.66 | 27.81 | 0.033 | 1.0021 | |

| P = 0.60 MPa | | | | | P = 0.70 MPa | | | | |
|-----------------------------------|----------------------|--------------------------------------|----------------|------|-----------------------------------|----------------------|--------------------------------------|----------------|--|
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 6.65 | 12.36 | 0.000 | 1.0813 | 440 | 5.81 | 12.79 | -0.008 | 1.0983 | |
| 6.80 | 12.45 | 0.009 | 1.0603 | 460 | 5.91 | 12.76 | 0.004 | 1.0724 | |
| 6.98 | 12.71 | 0.016 | 1.0461 | 480 | 6.05 | 12.93 | 0.012 | 1.0549 | |
| 7.20 | 13.07 | 0.020 | 1.0360 | 500 | 6.21 | 13.24 | 0.017 | 1.0428 | |
| 7.42 | 13.49 | 0.022 | 1.0288 | 520 | 6.40 | 13.62 | 0.021 | 1.0340 | |
| 7.67 | 13.96 | 0.024 | 1.0234 | 540 | 6.60 | 14.06 | 0.023 | 1.0276 | |
| 7.92 | 14.46 | 0.026 | 1.0193 | 560 | 6.81 | 14.54 | 0.025 | 1.0227 | |
| 8.17 | 14.98 | 0.027 | 1.0161 | 580 | 7.02 | 15.05 | 0.026 | 1.0190 | |
| 8.43 | 15.53 | 0.028 | 1.0137 | 600 | 7.24 | 15.58 | 0.027 | 1.0161 | |
| 8.69 | 16.08 | 0.028 | 1.0117 | 620 | 7.47 | 16.13 | 0.028 | 1.0138 | |
| 8.96 | 16.65 | 0.029 | 1.0102 | 640 | 7.69 | 16.69 | 0.028 | 1.0119 | |
| 9.23 | 17.23 | 0.029 | 1.0089 | 660 | 7.92 | 17.27 | 0.029 | 1.0104 | |
| 9.50 | 17.81 | 0.029 | 1.0079 | 680 | 8.15 | 17.85 | 0.029 | 1.0092 | |
| 9.77 | 18.41 | 0.030 | 1.0070 | 700 | 8.38 | 18.43 | 0.030 | 1.0082 | |
| 10.04 | 19.01 | 0.030 | 1.0063 | 720 | 8.62 | 19.03 | 0.030 | 1.0074 | |
| 10.31 | 19.61 | 0.030 | 1.0057 | 740 | 8.85 | 19.63 | 0.030 | 1.0066 | |
| 10.59 | 20.22 | 0.031 | 1.0052 | 760 | 9.08 | 20.24 | 0.030 | 1.0061 | |
| 10.86 | 20.83 | 0.031 | 1.0047 | 780 | 9.32 | 20.85 | 0.031 | 1.0056 | |
| 11.13 | 21.45 | 0.031 | 1.0044 | 800 | 9.55 | 21.46 | 0.031 | 1.0051 | |
| 11.82 | 23.01 | 0.031 | 1.0037 | 850 | 10.14 | 23.02 | 0.031 | 1.0043 | |
| 12.51 | 24.59 | 0.032 | 1.0032 | 900 | 10.73 | 24.60 | 0.032 | 1.0037 | |
| 13.20 | 26.19 | 0.032 | 1.0028 | 950 | 11.32 | 26.20 | 0.032 | 1.0033 | |
| 13.89 | 27.81 | 0.033 | 1.0025 | 1000 | 11.91 | 27.82 | 0.033 | 1.0030 | |

| P = 0.80 MPa | | | | | P = 0.90 MPa | | | | |
|-----------------------------------|----------------------|--------------------------------------|----------------|--------|-----------------------------------|----------------------|--------------------------------------|----------------|--|
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 0.046 | 29.86 | 0.132 | 10786. | 440 | 0.046 | 29.86 | 0.132 | 9647. | |
| 0.046 | 30.34 | 0.134 | 10344. | 443.59 | | | | | |
| 5.198 | 13.20 | -0.014 | 1.1097 | 443.59 | | | | | |
| | | | | 448.54 | 0.047 | 31.01 | 0.138 | 8710. | |
| | | | | 448.54 | 4.716 | 13.58 | -0.018 | 1.1179 | |
| 5.24 | 13.09 | -0.001 | 1.0851 | 460 | 4.73 | 13.44 | -0.007 | 1.0986 | |
| 5.34 | 13.17 | 0.009 | 1.0642 | 480 | 4.80 | 13.43 | 0.005 | 1.0739 | |
| 5.48 | 13.41 | 0.015 | 1.0498 | 500 | 4.91 | 13.60 | 0.012 | 1.0570 | |
| 5.63 | 13.76 | 0.019 | 1.0395 | 520 | 5.04 | 13.90 | 0.017 | 1.0450 | |
| 5.80 | 14.17 | 0.022 | 1.0319 | 540 | 5.18 | 14.28 | 0.021 | 1.0363 | |
| 5.98 | 14.63 | 0.024 | 1.0262 | 560 | 5.34 | 14.72 | 0.023 | 1.0298 | |
| 6.17 | 15.12 | 0.025 | 1.0219 | 580 | 5.50 | 15.20 | 0.025 | 1.0248 | |
| 6.35 | 15.64 | 0.026 | 1.0185 | 600 | 5.66 | 15.70 | 0.026 | 1.0209 | |
| 6.55 | 16.18 | 0.027 | 1.0158 | 620 | 5.83 | 16.23 | 0.027 | 1.0179 | |
| 6.74 | 16.74 | 0.028 | 1.0137 | 640 | 6.01 | 16.78 | 0.028 | 1.0155 | |
| 6.94 | 17.30 | 0.029 | 1.0120 | 660 | 6.18 | 17.34 | 0.028 | 1.0135 | |
| 7.14 | 17.88 | 0.029 | 1.0106 | 680 | 6.36 | 17.91 | 0.029 | 1.0119 | |
| 7.35 | 18.46 | 0.029 | 1.0094 | 700 | 6.54 | 18.49 | 0.029 | 1.0106 | |
| 7.55 | 19.05 | 0.030 | 1.0084 | 720 | 6.72 | 19.08 | 0.030 | 1.0095 | |
| 7.75 | 19.65 | 0.030 | 1.0076 | 740 | 6.90 | 19.67 | 0.030 | 1.0086 | |
| 7.95 | 20.26 | 0.030 | 1.0069 | 760 | 7.08 | 20.27 | 0.030 | 1.0078 | |
| 8.16 | 20.86 | 0.031 | 1.0064 | 780 | 7.26 | 20.88 | 0.030 | 1.0072 | |
| 8.36 | 21.48 | 0.031 | 1.0059 | 800 | 7.44 | 21.49 | 0.031 | 1.0066 | |
| 8.88 | 23.03 | 0.031 | 1.0049 | 850 | 7.90 | 23.04 | 0.031 | 1.0055 | |
| 9.39 | 24.61 | 0.032 | 1.0042 | 900 | 8.35 | 24.62 | 0.032 | 1.0048 | |
| 9.91 | 26.21 | 0.032 | 1.0038 | 950 | 8.81 | 26.21 | 0.032 | 1.0042 | |
| 10.43 | 27.83 | 0.033 | 1.0034 | 1000 | 9.28 | 27.83 | 0.033 | 1.0038 | |

| P = 1.0 MPa | | | | | P = 1.5 MPa | | | | |
|-----------------------------------|----------------------|--------------------------------------|----------------|--------|-----------------------------------|----------------------|--------------------------------------|----------------|--|
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 0.046 | 29.86 | 0.132 | 8728. | 440 | 0.046 | 29.84 | 0.132 | 5925. | |
| | | | | 460 | 0.049 | 32.62 | 0.147 | 4654. | |
| 0.048 | 31.64 | 0.142 | 7451. | 453.07 | | | | | |
| 4.33 | 13.94 | -0.022 | 1.1258 | 453.07 | | | | | |
| | | | | 471.48 | 0.052 | 34.37 | 0.1604 | 4042. | |
| | | | | 471.48 | 3.14 | 15.62 | -0.042 | 1.1628 | |
| 4.33 | 13.82 | -0.014 | 1.1128 | 460 | | | | | |
| 4.37 | 13.70 | 0.000 | 1.0840 | 480 | 3.12 | 15.32 | -0.029 | 1.1423 | |
| 4.46 | 13.80 | 0.009 | 1.0645 | 500 | 3.12 | 14.96 | -0.009 | 1.1064 | |
| 4.56 | 14.05 | 0.015 | 1.0508 | 520 | 3.15 | 14.91 | 0.003 | 1.0821 | |
| 4.69 | 14.40 | 0.019 | 1.0408 | 540 | 3.21 | 15.05 | 0.011 | 1.0650 | |
| 4.82 | 14.81 | 0.022 | 1.0334 | 560 | 3.28 | 15.32 | 0.016 | 1.0526 | |
| 4.96 | 15.27 | 0.024 | 1.0278 | 580 | 3.36 | 15.68 | 0.020 | 1.0434 | |
| 5.11 | 15.77 | 0.025 | 1.0234 | 600 | 3.45 | 16.10 | 0.022 | 1.0363 | |
| 5.26 | 16.28 | 0.026 | 1.0200 | 620 | 3.55 | 16.56 | 0.024 | 1.0308 | |
| 5.42 | 16.82 | 0.027 | 1.0173 | 640 | 3.65 | 17.05 | 0.025 | 1.0265 | |
| 5.57 | 17.38 | 0.028 | 1.0151 | 660 | 3.75 | 17.57 | 0.026 | 1.0231 | |
| 5.73 | 17.94 | 0.029 | 1.0133 | 680 | 3.85 | 18.11 | 0.027 | 1.0203 | |
| 5.89 | 18.52 | 0.029 | 1.0118 | 700 | 3.95 | 18.66 | 0.028 | 1.0180 | |
| 6.29 | 19.99 | 0.030 | 1.0091 | 750 | 4.22 | 20.10 | 0.029 | 1.0139 | |
| 6.70 | 21.51 | 0.031 | 1.0074 | 800 | 4.48 | 21.59 | 0.030 | 1.0112 | |
| 7.11 | 23.05 | 0.031 | 1.0062 | 850 | 4.76 | 23.12 | 0.031 | 1.0094 | |
| 7.52 | 24.63 | 0.032 | 1.0053 | 900 | 5.03 | 24.68 | 0.031 | 1.0081 | |
| 7.94 | 26.22 | 0.032 | 1.0047 | 950 | 5.30 | 26.26 | 0.032 | 1.0072 | |
| 8.35 | 27.84 | 0.033 | 1.0043 | 1000 | 5.58 | 27.87 | 0.032 | 1.0065 | |

| P = 2.0 MPa | | | | | P = 2.5 MPa | | | | |
|-----------------------------------|----------------------|--------------------------------------|----------------|--------|-----------------------------------|----------------------|--------------------------------------|----------------|--|
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 0.046 | 29.83 | 0.131 | 4500. | 440 | 0.046 | 29.82 | 0.132 | 3635. | |
| 0.049 | 32.60 | 0.147 | 3533. | 460 | 0.049 | 32.58 | 0.146 | 2855. | |
| 0.054 | 35.73 | 0.168 | 2760. | 480 | 0.054 | 35.70 | 0.168 | 2230. | |
| 0.055 | 36.69 | 0.176 | 2571. | 485.57 | | | | | |
| 2.523 | 17.16 | -0.065 | 1.1969 | 485.57 | | | | | |
| | | | | 497.14 | 0.059 | 38.78 | 0.194 | 1793. | |
| | | | | 497.14 | 2.148 | 18.65 | -0.089 | 1.2293 | |
| 2.479 | 16.45 | -0.037 | 1.1569 | 500 | 2.133 | 18.41 | -0.080 | 1.2188 | |
| 2.465 | 15.96 | -0.014 | 1.1184 | 520 | 2.073 | 17.27 | -0.038 | 1.1609 | |
| 2.483 | 15.83 | 0.000 | 1.0923 | 540 | 2.059 | 16.75 | -0.015 | 1.1231 | |
| 2.521 | 15.91 | 0.008 | 1.0738 | 560 | 2.071 | 16.59 | -0.001 | 1.0971 | |
| 2.571 | 16.14 | 0.014 | 1.0602 | 580 | 2.099 | 16.66 | 0.007 | 1.0785 | |
| 2.629 | 16.46 | 0.018 | 1.0501 | 600 | 2.138 | 16.87 | 0.013 | 1.0648 | |
| 2.694 | 16.86 | 0.021 | 1.0423 | 620 | 2.183 | 17.19 | 0.018 | 1.0544 | |
| 2.762 | 17.30 | 0.023 | 1.0362 | 640 | 2.234 | 17.57 | 0.021 | 1.0464 | |
| 2.834 | 17.78 | 0.025 | 1.0314 | 660 | 2.288 | 18.00 | 0.023 | 1.0401 | |
| 2.908 | 18.29 | 0.026 | 1.0275 | 680 | 2.345 | 18.47 | 0.024 | 1.0350 | |
| 2.984 | 18.81 | 0.027 | 1.0244 | 700 | 2.403 | 18.97 | 0.026 | 1.0310 | |
| 3.178 | 20.21 | 0.029 | 1.0187 | 750 | 2.555 | 20.32 | 0.028 | 1.0237 | |
| 3.377 | 21.67 | 0.030 | 1.0151 | 800 | 2.713 | 21.75 | 0.029 | 1.0190 | |
| 3.579 | 23.18 | 0.031 | 1.0126 | 850 | 2.873 | 23.24 | 0.030 | 1.0159 | |
| 3.78 | 24.73 | 0.031 | 1.0109 | 900 | 3.04 | 24.78 | 0.031 | 1.0137 | |
| 4.19 | 27.91 | 0.032 | 1.0087 | 1000 | 3.36 | 27.94 | 0.032 | 1.0109 | |

| P = 3.0 MPa | | | | | P = 4.0 MPa | | | | |
|-----------------------------------|----------------------|--------------------------------------|----------------|--------|-----------------------------------|----------------------|--------------------------------------|----------------|--|
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 0.046 | 29.80 | 0.130 | 3056. | 440 | 0.045 | 29.78 | 0.130 | 2328. | |
| 0.049 | 32.56 | 0.146 | 2400. | 460 | 0.049 | 32.51 | 0.145 | 1829. | |
| 0.054 | 35.67 | 0.166 | 1875. | 480 | 0.053 | 35.60 | 0.165 | 1429. | |
| 0.059 | 39.29 | 0.198 | 1454. | 500 | 0.059 | 39.19 | 0.196 | 1109. | |
| | | | | 520 | 0.067 | 43.53 | 0.243 | 850.5 | |
| 0.062 | 40.74 | 0.212 | 1325. | 507.04 | | | | | |
| 1.895 | 20.10 | -0.116 | 1.2609 | 507.04 | | | | | |
| | | | | 523.54 | 0.068 | 44.41 | 0.254 | 809.9 | |
| | | | | 523.54 | 1.578 | 23.03 | -0.179 | 1.3227 | |
| 1.833 | 18.90 | -0.073 | 1.2111 | 520 | | | | | |
| 1.788 | 17.86 | -0.035 | 1.1582 | 540 | 1.486 | 20.82 | -0.099 | 1.2451 | |
| 1.778 | 17.39 | -0.014 | 1.1230 | 560 | 1.433 | 19.39 | -0.050 | 1.1840 | |
| 1.789 | 17.25 | -0.001 | 1.0984 | 580 | 1.414 | 18.68 | -0.023 | 1.1436 | |
| 1.813 | 17.33 | 0.008 | 1.0805 | 600 | 1.415 | 18.39 | -0.007 | 1.1155 | |
| 1.845 | 17.54 | 0.014 | 1.0672 | 620 | 1.428 | 18.36 | 0.003 | 1.0951 | |
| 1.883 | 17.86 | 0.018 | 1.0570 | 640 | 1.449 | 18.50 | 0.010 | 1.0799 | |
| 1.925 | 18.24 | 0.020 | 1.0491 | 660 | 1.475 | 18.76 | 0.015 | 1.0682 | |
| 1.970 | 18.67 | 0.023 | 1.0428 | 680 | 1.504 | 19.10 | 0.019 | 1.0591 | |
| 2.017 | 19.14 | 0.024 | 1.0377 | 700 | 1.536 | 19.50 | 0.021 | 1.0519 | |
| 2.141 | 20.43 | 0.027 | 1.0288 | 750 | 1.623 | 20.68 | 0.025 | 1.0393 | |
| 2.270 | 21.84 | 0.029 | 1.0231 | 800 | 1.717 | 22.01 | 0.028 | 1.0314 | |
| 2.403 | 23.31 | 0.030 | 1.0193 | 850 | 1.815 | 23.44 | 0.029 | 1.0261 | |
| 2.537 | 24.83 | 0.031 | 1.0166 | 900 | 1.914 | 24.94 | 0.030 | 1.0225 | |
| 2.809 | 27.98 | 0.032 | 1.0132 | 1000 | 2.117 | 28.05 | 0.032 | 1.0178 | |
| P = 5.0 MPa | | | | | P = 6.0 MPa | | | | |
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 0.045 | 29.75 | 0.129 | 1889. | 440 | 0.045 | 29.72 | 0.129 | 1596. | |
| 0.049 | 32.47 | 0.144 | 1484. | 460 | 0.049 | 32.43 | 0.143 | 1254. | |
| 0.053 | 35.54 | 0.164 | 1161. | 480 | 0.053 | 35.47 | 0.162 | 981.3 | |
| 0.059 | 39.09 | 0.193 | 901.1 | 500 | 0.058 | 38.99 | 0.191 | 762.3 | |
| 0.066 | 43.38 | 0.239 | 691.9 | 520 | 0.066 | 43.22 | 0.235 | 586.0 | |
| | | | | 540 | 0.076 | 48.59 | 0.310 | 443.3 | |
| 0.075 | 47.96 | 0.302 | 544.6 | 537.13 | | | | | |
| 1.391 | 26.07 | -0.257 | 1.3845 | 537.13 | | | | | |
| | | | | 548.77 | 0.082 | 51.52 | 0.361 | 389.3 | |
| | | | | 548.77 | 1.274 | 29.32 | -0.355 | 1.4478 | |
| 1.367 | 25.38 | -0.229 | 1.3645 | 540 | | | | | |
| 1.256 | 22.16 | -0.111 | 1.2614 | 560 | 1.178 | 26.16 | -0.223 | 1.3629 | |
| 1.206 | 20.53 | -0.057 | 1.1981 | 580 | 1.087 | 22.98 | -0.110 | 1.2648 | |
| 1.187 | 19.71 | -0.028 | 1.1561 | 600 | 1.046 | 21.36 | -0.058 | 1.2036 | |
| 1.184 | 19.34 | -0.010 | 1.1266 | 620 | 1.029 | 20.52 | -0.029 | 1.1624 | |
| 1.192 | 19.26 | 0.001 | 1.1052 | 640 | 1.026 | 20.14 | -0.011 | 1.1332 | |
| 1.207 | 19.36 | 0.008 | 1.0891 | 660 | 1.032 | 20.04 | 0.000 | 1.1118 | |
| 1.227 | 19.58 | 0.014 | 1.0767 | 680 | 1.044 | 20.12 | 0.008 | 1.0957 | |
| 1.249 | 19.90 | 0.018 | 1.0670 | 700 | 1.059 | 20.34 | 0.013 | 1.0831 | |
| 1.314 | 20.94 | 0.023 | 1.0503 | 750 | 1.109 | 21.22 | 0.021 | 1.0618 | |
| 1.386 | 22.20 | 0.027 | 1.0400 | 800 | 1.166 | 22.40 | 0.025 | 1.0489 | |
| 1.463 | 23.58 | 0.029 | 1.0332 | 850 | 1.228 | 23.73 | 0.028 | 1.0405 | |
| 1.541 | 25.05 | 0.030 | 1.0285 | 900 | 1.293 | 25.16 | 0.029 | 1.0347 | |
| 1.702 | 28.13 | 0.032 | 1.0226 | 1000 | 1.426 | 28.21 | 0.031 | 1.0275 | |

| P = 8.0 MPa | | | | | P = 10.0 MPa | | | | |
|-----------------------------------|----------------------|--------------------------------------|----------------|--------|-----------------------------------|----------------------|--------------------------------------|----------------|--|
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 0.045 | 29.67 | 0.127 | 1228.5 | 440 | 0.045 | 29.62 | 0.126 | 1008.1 | |
| 0.048 | 32.35 | 0.141 | 966.3 | 460 | 0.048 | 32.27 | 0.140 | 793.5 | |
| 0.053 | 35.35 | 0.160 | 756.8 | 480 | 0.052 | 35.23 | 0.158 | 622.1 | |
| 0.058 | 38.81 | 0.187 | 588.7 | 500 | 0.057 | 38.63 | 0.184 | 484.6 | |
| 0.081 | 51.30 | 0.349 | 297.4 | 550 | 0.080 | 50.68 | 0.330 | 246.6 | |
| 0.098 | 59.02 | 0.525 | 223.4431 | 568.19 | | | | | |
| 1.151 | 36.79 | -0.644 | 1.5831 | 568.19 | | | | | |
| | | | | 584.18 | 0.120 | 67.69 | 0.798 | 141.3 | |
| | | | | 584.18 | 1.118 | 46.34 | -1.151 | 1.7378 | |
| 1.018 | 31.11 | -0.359 | 1.4573 | 580 | | | | | |
| 0.907 | 26.16 | -0.168 | 1.3282 | 600 | 0.900 | 34.84 | -0.461 | 1.5195 | |
| 0.855 | 23.70 | -0.088 | 1.2507 | 620 | 0.786 | 28.61 | -0.208 | 1.3718 | |
| 0.831 | 22.39 | -0.047 | 1.1997 | 640 | 0.733 | 25.56 | -0.109 | 1.2847 | |
| 0.822 | 21.71 | -0.023 | 1.1641 | 660 | 0.707 | 23.93 | -0.060 | 1.2279 | |
| 0.821 | 21.41 | -0.008 | 1.1382 | 680 | 0.695 | 23.05 | -0.031 | 1.1884 | |
| 0.827 | 21.36 | 0.002 | 1.1187 | 700 | 0.692 | 22.61 | -0.014 | 1.1596 | |
| 0.854 | 21.85 | 0.016 | 1.0867 | 750 | 0.704 | 22.58 | 0.009 | 1.1140 | |
| 0.893 | 22.83 | 0.022 | 1.0679 | 800 | 0.730 | 23.31 | 0.019 | 1.0883 | |
| 0.936 | 24.05 | 0.026 | 1.0558 | 850 | 0.762 | 24.39 | 0.024 | 1.0722 | |
| 0.983 | 25.41 | 0.028 | 1.0477 | 900 | 0.798 | 25.67 | 0.027 | 1.0613 | |
| 1.031 | 26.86 | 0.030 | 1.0419 | 950 | 0.835 | 27.07 | 0.029 | 1.0537 | |
| 1.081 | 28.38 | 0.031 | 1.0375 | 1000 | 0.874 | 28.55 | 0.030 | 1.0480 | |
| P = 12 MPa | | | | | P = 14 MPa | | | | |
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 0.045 | 29.58 | 0.125 | 861.4 | 440 | 0.044 | 29.53 | 0.124 | 756.9 | |
| 0.048 | 32.20 | 0.138 | 678.5 | 460 | 0.048 | 32.13 | 0.137 | 596.5 | |
| 0.052 | 35.12 | 0.155 | 532.4 | 480 | 0.052 | 35.01 | 0.153 | 468.5 | |
| 0.057 | 38.45 | 0.179 | 415.3 | 500 | 0.057 | 38.29 | 0.176 | 366.0 | |
| 0.078 | 50.11 | 0.314 | 212.8 | 550 | 0.077 | 49.58 | 0.300 | 188.7 | |
| | | | | 600 | 0.145 | 77.29 | 1.175 | 82.3 | |
| 0.149 | 78.55 | 1.298 | 94.70 | 597.86 | | | | | |
| 1.153 | 59.43 | -2.118 | 1.9231 | 597.86 | | | | | |
| | | | | 609.85 | 0.193 | 93.44 | 2.337 | 65.8 | |
| | | | | 609.85 | 1.261 | 78.85 | -4.179 | 2.1560 | |
| 1.088 | 55.36 | -1.729 | 1.8662 | 600 | | | | | |
| 0.796 | 36.93 | -0.494 | 1.5492 | 620 | 0.925 | 54.04 | -1.456 | 1.8433 | |
| 0.693 | 30.23 | -0.224 | 1.3972 | 640 | 0.702 | 37.57 | -0.466 | 1.5538 | |
| 0.644 | 26.94 | -0.119 | 1.3072 | 660 | 0.617 | 31.13 | -0.219 | 1.4085 | |
| 0.620 | 25.15 | -0.066 | 1.2482 | 680 | 0.576 | 27.88 | -0.118 | 1.3207 | |
| 0.608 | 24.16 | -0.036 | 1.2069 | 700 | 0.554 | 26.09 | -0.066 | 1.2622 | |
| 0.607 | 23.43 | 0.000 | 1.1443 | 750 | 0.539 | 24.41 | -0.011 | 1.1780 | |
| 0.623 | 23.85 | 0.015 | 1.1103 | 800 | 0.548 | 24.45 | 0.009 | 1.1341 | |
| 0.647 | 24.77 | 0.022 | 1.0895 | 850 | 0.565 | 25.18 | 0.019 | 1.1080 | |
| 0.675 | 25.96 | 0.025 | 1.0757 | 900 | 0.588 | 26.27 | 0.024 | 1.0909 | |
| 0.705 | 27.30 | 0.028 | 1.0661 | 950 | 0.613 | 27.54 | 0.027 | 1.0790 | |
| 0.737 | 28.74 | 0.030 | 1.0589 | 1000 | 0.639 | 28.94 | 0.029 | 1.0703 | |

| P = 16 MPa | | | | | P = 18 MPa | | | | |
|-----------------------------------|----------------------|--------------------------------------|----------------|--------|-----------------------------------|----------------------|--------------------------------------|----------------|--|
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 0.044 | 29.49 | 0.123 | 678.7 | 440 | 0.044 | 29.45 | 0.122 | 618.2 | |
| 0.047 | 32.06 | 0.134 | 535.3 | 460 | 0.047 | 31.99 | 0.133 | 487.9 | |
| 0.051 | 34.91 | 0.151 | 420.8 | 480 | 0.051 | 34.81 | 0.149 | 383.9 | |
| 0.056 | 38.13 | 0.173 | 329.1 | 500 | 0.056 | 37.98 | 0.170 | 300.6 | |
| 0.062 | 41.88 | 0.204 | 255.4 | 520 | 0.062 | 41.65 | 0.199 | 233.7 | |
| 0.070 | 46.40 | 0.252 | 196.0 | 540 | 0.069 | 46.04 | 0.244 | 179.8 | |
| 0.082 | 52.18 | 0.333 | 147.9 | 560 | 0.080 | 51.58 | 0.317 | 136.2 | |
| 0.100 | 60.27 | 0.499 | 108.7 | 580 | 0.097 | 59.15 | 0.458 | 100.7 | |
| 0.136 | 73.98 | 0.969 | 76.2 | 600 | 0.128 | 71.29 | 0.823 | 71.4 | |
| 0.269 | 116.56 | 4.935 | 46.6744 | 620.54 | | | | | |
| 1.482 | 110.88 | -9.374 | 2.4619 | 620.54 | | | | | |
| | | | | 630.19 | 0.425 | 160.30 | 13.873 | 33.13 | |
| | | | | 630.19 | 1.942 | 173.30 | -26.743 | 2.9166 | |
| 0.777 | 50.61 | -1.093 | 1.7901 | 640 | 1.007 | 80.38 | 605 | 2.2062 | |
| 0.620 | 37.27 | -0.405 | 1.5424 | 660 | 0.660 | 46.86 | 1.792 | 1.7287 | |
| 0.554 | 31.52 | -0.201 | 1.4101 | 680 | 0.552 | 36.49 | -0.336 | 1.5231 | |
| 0.520 | 28.51 | -0.111 | 1.3277 | 700 | 0.501 | 31.60 | -0.175 | 1.4059 | |
| 0.502 | 26.82 | -0.063 | 1.2717 | 720 | 0.475 | 28.93 | -0.099 | 1.3303 | |
| 0.494 | 25.86 | -0.035 | 1.2315 | 740 | 0.461 | 27.40 | -0.057 | 1.2778 | |
| 0.490 | 25.35 | -0.017 | 1.2014 | 760 | 0.453 | 26.53 | -0.032 | 1.2395 | |
| 0.490 | 25.14 | -0.005 | 1.1782 | 780 | 0.451 | 26.07 | -0.015 | 1.2104 | |
| 0.492 | 25.12 | 0.003 | 1.1598 | 800 | 0.451 | 25.88 | -0.004 | 1.1877 | |
| 0.505 | 25.64 | 0.016 | 1.1276 | 850 | 0.459 | 26.13 | 0.012 | 1.1484 | |
| 0.523 | 26.60 | 0.022 | 1.1068 | 900 | 0.473 | 26.95 | 0.020 | 1.1235 | |
| 0.566 | 29.15 | 0.028 | 1.0821 | 1000 | 0.509 | 29.38 | 0.027 | 1.0943 | |
| P = 20 MPa | | | | | P = 22 MPa | | | | |
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 0.044 | 29.40 | 0.121 | 570.0 | 440 | 0.044 | 29.37 | 0.121 | 530.8 | |
| 0.047 | 31.93 | 0.132 | 450.1 | 460 | 0.047 | 31.87 | 0.131 | 419.4 | |
| 0.051 | 34.71 | 0.147 | 354.4 | 480 | 0.050 | 34.62 | 0.145 | 330.5 | |
| 0.055 | 37.83 | 0.167 | 277.9 | 500 | 0.055 | 37.69 | 0.164 | 259.4 | |
| 0.061 | 41.43 | 0.194 | 216.4 | 520 | 0.060 | 41.22 | 0.190 | 202.4 | |
| 0.068 | 45.70 | 0.235 | 166.9 | 540 | 0.068 | 45.38 | 0.229 | 156.4 | |
| 0.079 | 51.02 | 0.301 | 126.8 | 560 | 0.077 | 50.50 | 0.289 | 119.2 | |
| 0.094 | 58.14 | 0.425 | 94.3 | 580 | 0.092 | 57.23 | 0.396 | 89.1 | |
| 0.122 | 69.05 | 0.715 | 67.6 | 600 | 0.117 | 67.15 | 0.631 | 64.5 | |
| 0.189 | 91.70 | 1.876 | 45.0 | 620 | 0.170 | 85.75 | 1.415 | 43.9 | |
| | | | | 640 | 0.454 | 164.88 | 12.525 | 24.6 | |
| 0.918 | 283.29 | 75.652 | 22.7905 | 638.95 | | | | | |
| 3.223 | 347.98 | -137.362 | 3.6870 | 638.95 | | | | | |
| 2.421 | 253.20 | -60.804 | 3.3880 | 640 | | | | | |
| 0.758 | 63.70 | -1.767 | 2.0090 | 660 | 0.992 | 100.26 | -5.267 | 2.4944 | |
| 0.570 | 43.54 | -0.575 | 1.6702 | 680 | 0.613 | 54.05 | -1.029 | 1.8697 | |
| 0.495 | 35.58 | -0.272 | 1.5010 | 700 | 0.501 | 40.82 | -0.422 | 1.6186 | |
| 0.458 | 31.52 | -0.149 | 1.3987 | 720 | 0.449 | 34.71 | -0.218 | 1.4792 | |
| 0.437 | 29.23 | -0.086 | 1.3304 | 740 | 0.421 | 31.39 | -0.124 | 1.3903 | |
| 0.426 | 27.89 | -0.050 | 1.2818 | 760 | 0.406 | 29.46 | -0.073 | 1.3290 | |
| 0.420 | 27.13 | -0.028 | 1.2456 | 780 | 0.397 | 28.32 | -0.043 | 1.2843 | |
| 0.418 | 26.73 | -0.013 | 1.2178 | 800 | 0.393 | 27.68 | -0.023 | 1.2505 | |
| 0.422 | 26.67 | 0.008 | 1.1705 | 850 | 0.393 | 27.26 | 0.003 | 1.1940 | |
| 0.433 | 27.34 | 0.018 | 1.1411 | 900 | 0.401 | 27.75 | 0.015 | 1.1595 | |
| 0.464 | 29.61 | 0.026 | 1.1069 | 1000 | 0.427 | 29.86 | 0.025 | 1.1200 | |

| P = 24 MPa | | | | | P = 26 MPa | | | | |
|-----------------------------------|----------------------|--------------------------------------|----------------|------|-----------------------------------|----------------------|--------------------------------------|----------------|--|
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 0.043 | 29.33 | 0.120 | 498.4 | 440 | 0.043 | 29.29 | 0.119 | 471.1 | |
| 0.047 | 31.81 | 0.130 | 394.0 | 460 | 0.046 | 31.75 | 0.128 | 372.7 | |
| 0.050 | 34.53 | 0.143 | 310.8 | 480 | 0.050 | 34.44 | 0.142 | 294.2 | |
| 0.054 | 37.56 | 0.161 | 244.2 | 500 | 0.054 | 37.43 | 0.159 | 231.4 | |
| 0.060 | 41.02 | 0.186 | 190.7 | 520 | 0.059 | 40.83 | 0.182 | 181.0 | |
| 0.067 | 45.07 | 0.222 | 147.72 | 540 | 0.066 | 44.79 | 0.215 | 140.46 | |
| 0.076 | 50.01 | 0.277 | 112.98 | 560 | 0.075 | 49.56 | 0.266 | 107.74 | |
| 0.090 | 56.39 | 0.371 | 84.83 | 580 | 0.088 | 55.63 | 0.349 | 81.25 | |
| 0.112 | 65.50 | 0.566 | 61.87 | 600 | 0.108 | 64.05 | 0.514 | 59.69 | |
| 0.157 | 81.28 | 1.129 | 42.83 | 620 | 0.146 | 77.76 | 0.935 | 41.92 | |
| 0.315 | 127.37 | 5.021 | 25.99 | 640 | 0.253 | 110.09 | 2.911 | 26.67 | |
| 1.810 | 232.90 | -34.063 | 3.6665 | 660 | 2.343 | 505.00 | 60.889 | 9.2964 | |
| 0.695 | 70.91 | -2.000 | 2.1563 | 680 | 0.842 | 100.67 | -4.377 | 2.6044 | |
| 0.519 | 47.86 | -0.662 | 1.7672 | 700 | 0.553 | 57.56 | -1.058 | 1.9600 | |
| 0.448 | 38.68 | -0.315 | 1.5748 | 720 | 0.454 | 43.65 | -0.453 | 1.6897 | |
| 0.412 | 33.97 | -0.174 | 1.4590 | 740 | 0.407 | 37.04 | -0.239 | 1.5381 | |
| 0.391 | 31.28 | -0.102 | 1.3818 | 760 | 0.381 | 33.38 | -0.138 | 1.4410 | |
| 0.379 | 29.68 | -0.061 | 1.3269 | 780 | 0.366 | 31.22 | -0.083 | 1.3737 | |
| 0.373 | 28.73 | -0.036 | 1.2860 | 800 | 0.357 | 29.91 | -0.050 | 1.3245 | |
| 0.369 | 27.90 | -0.002 | 1.2190 | 850 | 0.349 | 28.60 | -0.009 | 1.2455 | |
| 0.375 | 28.19 | 0.012 | 1.1788 | 900 | 0.353 | 28.66 | 0.009 | 1.1991 | |
| 0.385 | 29.01 | 0.020 | 1.1523 | 950 | 0.361 | 29.35 | 0.018 | 1.1688 | |
| 0.397 | 30.12 | 0.024 | 1.1335 | 1000 | 0.371 | 30.39 | 0.023 | 1.1475 | |

| P = 30 MPa | | | | | P = 40 MPa | | | | |
|-----------------------------------|----------------------|--------------------------------------|----------------|------|-----------------------------------|----------------------|--------------------------------------|----------------|--|
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 0.043 | 29.22 | 0.116 | 428.1 | 440 | 0.042 | 29.07 | 0.113 | 360.8 | |
| 0.046 | 31.64 | 0.125 | 339.0 | 460 | 0.045 | 31.40 | 0.121 | 286.3 | |
| 0.049 | 34.28 | 0.138 | 268.0 | 480 | 0.048 | 33.91 | 0.131 | 227.1 | |
| 0.053 | 37.19 | 0.154 | 211.2 | 500 | 0.052 | 36.65 | 0.144 | 179.8 | |
| 0.058 | 40.47 | 0.175 | 165.7 | 520 | 0.056 | 39.69 | 0.160 | 141.9 | |
| 0.065 | 44.25 | 0.205 | 129.05 | 540 | 0.062 | 43.11 | 0.182 | 111.40 | |
| 0.073 | 48.73 | 0.247 | 99.51 | 560 | 0.068 | 47.03 | 0.212 | 86.86 | |
| 0.084 | 54.28 | 0.314 | 75.63 | 580 | 0.077 | 51.65 | 0.253 | 67.06 | |
| 0.101 | 61.63 | 0.434 | 56.26 | 600 | 0.090 | 57.29 | 0.316 | 51.07 | |
| 0.131 | 72.51 | 0.692 | 40.44 | 620 | 0.108 | 64.56 | 0.421 | 38.13 | |
| 0.194 | 92.52 | 1.477 | 27.26 | 640 | 0.137 | 74.70 | 0.615 | 27.63 | |
| 0.437 | 153.52 | 6.262 | 15.53 | 660 | 0.191 | 90.61 | 1.029 | 19.06 | |
| 1.306 | 236.68 | -13.282 | 4.885 | 680 | 0.312 | 118.52 | 1.792 | 12.03 | |
| 0.673 | 90.69 | -2.850 | 2.576 | 700 | 0.537 | 148.65 | 0.289 | 6.634 | |
| 0.488 | 57.85 | -0.931 | 2.003 | 720 | 0.571 | 118.22 | -2.398 | 3.749 | |
| 0.411 | 45.07 | -0.434 | 1.7372 | 740 | 0.459 | 79.41 | -1.400 | 2.637 | |
| 0.371 | 38.60 | -0.238 | 1.5832 | 760 | 0.382 | 59.18 | -0.712 | 2.144 | |
| 0.348 | 34.90 | -0.141 | 1.4826 | 780 | 0.336 | 48.49 | -0.396 | 1.8761 | |
| 0.334 | 32.66 | -0.087 | 1.4121 | 800 | 0.309 | 42.31 | -0.238 | 1.7097 | |
| 0.319 | 30.16 | -0.024 | 1.3036 | 850 | 0.285 | 36.86 | -0.084 | 1.4835 | |
| 0.318 | 29.69 | 0.001 | 1.2425 | 900 | 0.265 | 32.86 | -0.024 | 1.3702 | |
| 0.323 | 30.11 | 0.014 | 1.2036 | 950 | 0.263 | 32.33 | 0.000 | 1.3028 | |
| 0.331 | 30.98 | 0.020 | 1.1768 | 1000 | 0.266 | 32.66 | 0.012 | 1.2583 | |

| P = 50 MPa | | | | | P = 60 MPa | | | | |
|-----------------------------------|----------------------|--------------------------------------|----------------|------|-----------------------------------|----------------------|--------------------------------------|----------------|--|
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 0.041 | 28.95 | 0.110 | 323.6 | 440 | 0.041 | 28.85 | 0.107 | 301.8 | |
| 0.044 | 31.20 | 0.116 | 257.3 | 460 | 0.043 | 31.03 | 0.112 | 240.3 | |
| 0.047 | 33.61 | 0.125 | 204.6 | 480 | 0.046 | 33.35 | 0.120 | 191.5 | |
| 0.050 | 36.20 | 0.136 | 162.60 | 500 | 0.049 | 35.83 | 0.128 | 152.7 | |
| 0.054 | 39.04 | 0.149 | 128.95 | 520 | 0.053 | 38.51 | 0.140 | 121.6 | |
| 0.059 | 42.19 | 0.166 | 101.93 | 540 | 0.057 | 41.43 | 0.153 | 96.64 | |
| 0.065 | 45.71 | 0.187 | 80.18 | 560 | 0.062 | 44.65 | 0.169 | 76.56 | |
| 0.072 | 49.71 | 0.215 | 62.64 | 580 | 0.068 | 48.22 | 0.189 | 60.38 | |
| 0.082 | 54.37 | 0.252 | 48.49 | 600 | 0.076 | 52.23 | 0.213 | 47.32 | |
| 0.095 | 59.92 | 0.306 | 37.08 | 620 | 0.086 | 56.79 | 0.244 | 36.79 | |
| 0.113 | 66.77 | 0.385 | 27.88 | 640 | 0.099 | 62.06 | 0.284 | 28.31 | |
| 0.140 | 75.61 | 0.506 | 20.47 | 660 | 0.116 | 68.22 | 0.334 | 21.51 | |
| 0.184 | 87.32 | 0.669 | 14.54 | 680 | 0.141 | 75.46 | 0.389 | 16.07 | |
| 0.254 | 101.74 | 0.721 | 9.884 | 700 | 0.175 | 83.61 | 0.415 | 11.78 | |
| 0.343 | 111.60 | 0.112 | 6.461 | 720 | 0.219 | 91.25 | 0.315 | 8.473 | |
| 0.389 | 103.33 | -0.860 | 4.305 | 740 | 0.264 | 94.55 | -0.023 | 6.060 | |
| 0.370 | 83.55 | -0.980 | 3.139 | 760 | 0.292 | 89.79 | -0.431 | 4.434 | |
| 0.332 | 66.73 | -0.691 | 2.519 | 780 | 0.294 | 79.09 | -0.588 | 3.416 | |
| 0.300 | 55.53 | -0.445 | 2.162 | 800 | 0.280 | 67.81 | -0.519 | 2.792 | |
| 0.255 | 41.87 | -0.157 | 1.725 | 850 | 0.240 | 49.45 | -0.236 | 2.041 | |
| 0.245 | 38.81 | -0.064 | 1.530 | 900 | 0.219 | 41.53 | -0.100 | 1.727 | |
| 0.230 | 35.05 | -0.019 | 1.421 | 950 | 0.208 | 38.19 | -0.041 | 1.561 | |
| 0.228 | 34.66 | 0.001 | 1.352 | 1000 | 0.204 | 36.95 | -0.012 | 1.461 | |

| P = 80 MPa | | | | | P = 100 MPa | | | | |
|-----------------------------------|----------------------|--------------------------------------|----------------|------|-----------------------------------|----------------------|--------------------------------------|----------------|--|
| V ₂ | H ₂ | Cp ₂ | φ ₂ | T | V ₂ | H ₂ | Cp ₂ | φ ₂ | |
| dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | K | dm ³ mol ⁻¹ | kJ mol ⁻¹ | kJ mol ⁻¹ K ⁻¹ | | |
| 0.040 | 28.71 | 0.102 | 281.9 | 440 | 0.038 | 28.64 | 0.097 | 279.1 | |
| 0.042 | 30.78 | 0.105 | 225.0 | 460 | 0.040 | 30.61 | 0.101 | 223.0 | |
| 0.044 | 32.95 | 0.112 | 180.0 | 480 | 0.043 | 32.66 | 0.105 | 178.8 | |
| 0.047 | 35.24 | 0.117 | 144.1 | 500 | 0.045 | 34.81 | 0.110 | 143.8 | |
| 0.050 | 37.67 | 0.125 | 115.55 | 520 | 0.048 | 37.06 | 0.115 | 115.78 | |
| 0.053 | 40.27 | 0.135 | 92.62 | 540 | 0.051 | 39.44 | 0.122 | 93.37 | |
| 0.057 | 43.06 | 0.145 | 74.17 | 560 | 0.054 | 41.95 | 0.129 | 75.35 | |
| 0.062 | 46.06 | 0.156 | 59.30 | 580 | 0.058 | 44.59 | 0.136 | 60.82 | |
| 0.068 | 49.30 | 0.168 | 47.30 | 600 | 0.062 | 47.37 | 0.142 | 49.08 | |
| 0.075 | 52.78 | 0.181 | 37.60 | 620 | 0.067 | 50.27 | 0.148 | 39.57 | |
| 0.083 | 56.52 | 0.194 | 29.78 | 640 | 0.073 | 53.29 | 0.153 | 31.89 | |
| 0.093 | 60.52 | 0.206 | 23.48 | 660 | 0.080 | 56.40 | 0.157 | 25.67 | |
| 0.105 | 64.74 | 0.215 | 18.42 | 680 | 0.088 | 59.53 | 0.156 | 20.65 | |
| 0.119 | 69.06 | 0.215 | 14.385 | 700 | 0.097 | 62.62 | 0.151 | 16.60 | |
| 0.137 | 73.19 | 0.194 | 11.193 | 720 | 0.107 | 65.52 | 0.138 | 13.36 | |
| 0.156 | 76.58 | 0.138 | 8.701 | 740 | 0.118 | 68.06 | 0.114 | 10.777 | |
| 0.176 | 78.39 | 0.036 | 6.794 | 760 | 0.129 | 69.97 | 0.075 | 8.730 | |
| 0.193 | 77.80 | -0.096 | 5.372 | 780 | 0.141 | 70.97 | 0.023 | 7.123 | |
| 0.204 | 74.65 | -0.211 | 4.340 | 800 | 0.151 | 70.83 | -0.038 | 5.876 | |
| 0.205 | 61.53 | -0.261 | 2.883 | 850 | 0.166 | 65.61 | -0.153 | 3.891 | |
| 0.192 | 50.97 | -0.160 | 2.239 | 900 | 0.166 | 57.61 | -0.152 | 2.888 | |
| 0.181 | 45.04 | -0.084 | 1.912 | 950 | 0.161 | 51.19 | -0.103 | 2.356 | |
| 0.175 | 42.07 | -0.040 | 1.723 | 1000 | 0.156 | 47.16 | -0.060 | 2.049 | |

APPENDIX B. The FORTRAN Code for the Model Parameters

The FORTRAN programs used for the generation of the tables and the calculation of the various properties are those described in ref. 5 with the following changes to DATA statements:

In the subroutine BLOCKDATA use the following lines in place of the similar lines from the listing:

```
DATA PH0,FTT,FVV,PHC,THC/1.253D0,0.978D0,1.233D0,.067D0,-.124D0/  
DATA PHD,PHT,THD,THT/-0.125D0,-0.051D0,-.012D0,.018D0/
```

```
DATA TI1,PI1,DI1/126.20D0,3.400D0,311.D0/  
*, WM0,WM1,R/18.0152D0,28.01D0,8.31441D0/, Z0/.317763D0/
```

In the subroutine FZ1 use the following DATA statement to define the parameters of the ideal gas properties of N2:

```
DATA A0/ 0.576564D0,-8.26099D0,-1.291303D0/
```

The rather simplified program should not be used blindly since accurate information is not available as to the location of phase boundaries.

The phase for which calculations will be made is determined by the initial guess for the densities.

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